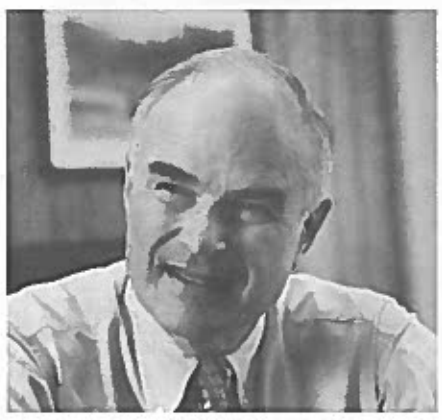
GrummanWorld

Volume 5, Number 22 December 22, 1986

A Letter From The Chairman

'We Have Every Right In The World To Be Proud'



This is our first annual report just for Grumman people. It doesn't replace the annual report to shareholders, of course, which will come out in March. That report will contain a more complete look at how we did financially in 1986. But even though most Grumman people are also shareholders and will receive a copy of that report, we saw a need to review the year in our own "talking to each other" terms as well.

This special issue of *Grumman World* is kind of a companion piece, then, to the book you'll see in March. It talks about the things we invented, the courses we took, the problems we had, and the money we spent, as well as the technologies we invested in, the facilities we built, and the things we tried to learn to do better. And whether or not you see your name or your picture in these pages, this book represents your hard work in 1986 to make this a better, stronger company.

What kind of year was it?

A good one. By the middle of 1986, our funded backlog was more than $7 billion, the highest in our history. We continued to build on our reputation for the design and integration of sophisticated electronics systems. Each one of our five production aircraft programs remained solid. Even though there are some problems with the onboard computer, our F-14D development program made excellent progress; its interim precursor, the F-14A+, went supersonic on its first test flight in September. The first full-scale development A-6F will be flight tested by the middle of next year.

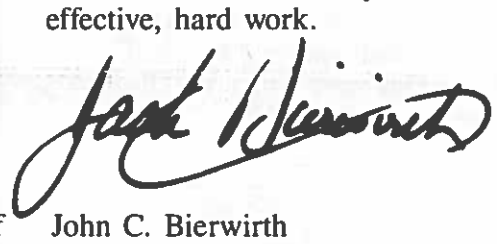
In the past two years, we have gone after a number of major contracts. We won the F-14D/A-6F development contract, we won Joint STARS, the Long Life Vehicle for the U.S. Postal Service, and Intermediate Forward Test Equipment (IFTE) for the Army. Last year we lost STSOC, which was the Space Transportation System Operations Contract, and a couple of weeks ago we lost CASS.

CASS was a disappointment to all of us, especially to the 150 people who worked so hard and so well on it for the last four years. Everyone knows that you can't win them all — but four out of six so far is a pretty good score.

In 1987, the first group of people from the Space Systems Division will move to Houston; the first LLV will roll off the assembly line. In general, we will see more and more of our contracts go from the win phase to the implementation phase. Financially, it will be a replica of 1986: you can't make very much money on pre-production programs, or in early production periods.

But we have locked onto a bigger future than anyone could have imagined for us 10 years ago. It is tough, slogging work to build a corporation, and we got a lot of that work done in 1986. In addition, we gave blood, collected food for the less fortunate in our communities, and donated our time and money to a broad range of worthwhile civic and social programs. Take a look through these pages and see all the good things we accomplished this year. We have every right in the world to be proud of ourselves.

To you and your families and friends I wish the peace and joy of this holiday season — and a well-earned rest after a year of effective, hard work.



John C. Bierwirth
Chairman

Another Intruder Is Ready To Launch. *Aboard the U.S.S. Enterprise, a sailor stands by and waits for the signal to launch an A-6E Intruder from squadron VA-95. (Photo courtesy of the U.S. Navy)*

What's Inside

'It's Going To Be A Pressure Cooker Year.' An Interview With O'Brien - Pg. 6

What Business Is Grumman In? By Robert Sobel - Pg. 14

Putting All Together The Pieces - Pg. 2

A Glance At Grumman - Pg. 3

A Financial Report: How Much We Earned And How We Spent It - Pg. 8

Your Hidden Paycheck - Pg. 9

Modernization Continues In '86 - Pg. 11

Where We Are - Pg. 12

Transfers Up Dramatically - Pg. 17

A Smoldering Situation: Smoking Banned In The Workplace - Pg. 18

Drug Testing - A Volatile Issue - Pg. 19

Grummanites Use A Variety Of Methods In Their Quest For Better Way - Pg. 20

Grumman: A Good Corporate Citizen - Pg. 21

Grumman And Universities Share Their Brainpower - Pg. 22

Putting The Pieces Together

Over the last 12 months, Grumman used a total of 38.6 tons — 77,260 pounds — of rivets to build aircraft.

That's a lot of rivets. But then, it takes a lot of parts to build a Prowler, or Tomcat, or any other Grumman aircraft.

According to Material Management, the C-2A Greyhound, the workhorse carrier-on-board delivery aircraft, has the most parts of any Grumman plane. At 49,658 parts, it has 1,298 more than an F-14. The Hawkeye is made up of 44,507 parts; the EA-6B Prowler, 35,513; and the A-6E Intruder, 33,290.

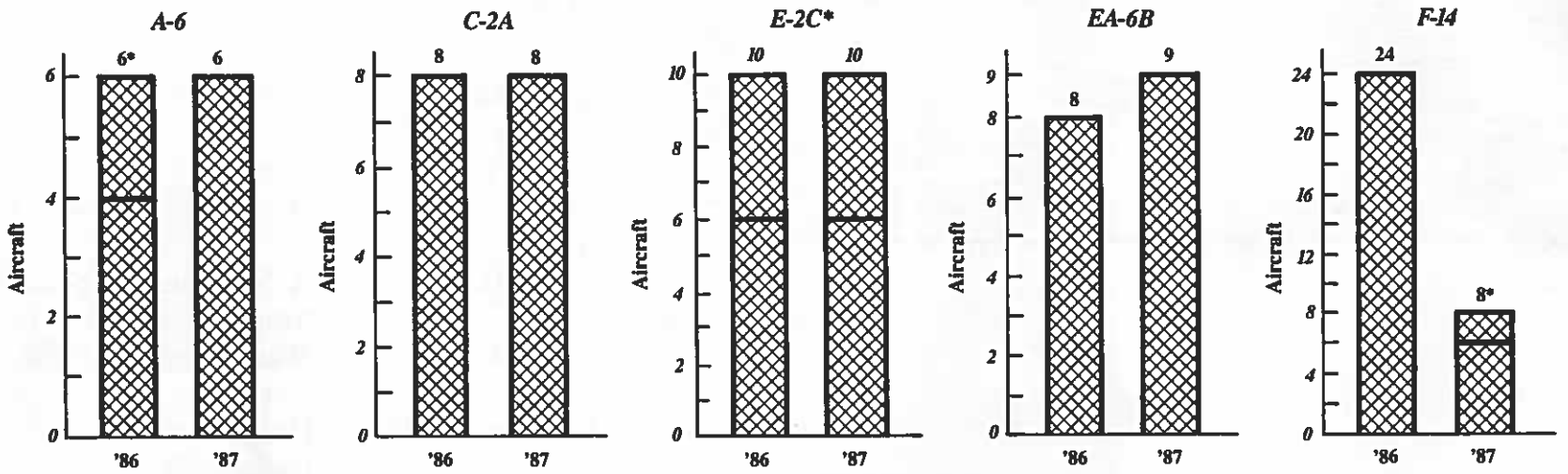
Most of the structural parts are made of aluminum: Grumman purchased 3,348,261 pounds of it this year.

Grumman Olson is another big user of aluminum. Each Long Life Vehicle will require about 800 pounds of aluminum. The contract with the U.S. Postal Service calls for 99,150 LLVs, with an option for 59,490 more. The new, automated assembly line in Montgomery, Pennsylvania, will begin turning out LLVs next April.

This year, Grumman Olson expects to deliver about 12,200 Kurbmasters, Kurbettes, and V-Body trucks. Olson marked its 40th anniversary this year and produced its 200,000th truck.

Right Ingredients. *Though only with Grumman a year, Fred Blount, above, knows the mix of systems that make an F-14. He is installing the chaff panel in the weapon systems officer's cockpit of M27, the 27th F-14 built. Blount is one of the Calverton team updating Tomcats under the Block 60/65 program. Al Victorino of Raw Materials Operations, at left, sees all the basic ingredients. These aluminum plates outside the warehouses in Bethpage will someday be parts of planes in a carrier air wing.*

Charting The Course Of Aircraft Deliveries



A-6 — Not included in the A-6 program figures is modification work. In 1986 12 A-6E's were re-winged, 11 were retrofitted with Target Recognition Attack Multisensors (TRAMs), and reliability and maintainability work was done on six KA-6D tankers.

C-2A — The Reprocured Greyhound is being produced under a multiyear contract that calls for a total of 39 aircraft. Deliveries began last year and will continue through 1989.

E-2C — Deliveries of foreign military sales aircraft in 1986 include three Hawkeyes for Singapore and one for Egypt. The 1987 figures include three planes for Egypt and one more for Singapore. The passage of Public Law 99-570 calls for the Coast Guard and the Customs Service each to get two Hawkeyes for their drug enforcement efforts. This will be done by the transfer of Navy fleet aircraft before the end of 1987.

EA-6B — The Prowler program also involves modification work. In 1986 seven EXCAP aircraft were converted to ICAP-2, the latest production configuration. There were also six ICAP-1 planes converted to ICAP-2.

F-14 — The drop in 1987 deliveries is due to the production changeovers needed to build F-14A+ Tomcats. The first Block 60/65 Update Program aircraft was slated to be delivered to the Texas Naval Reserve at the end of this year. Another 18 will be completed in 1987.

Grumman At A Glance

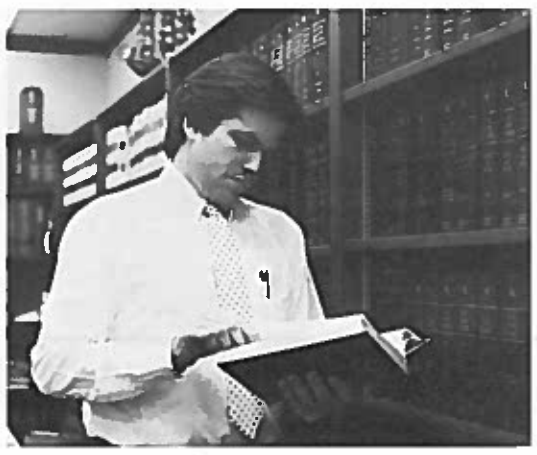
Grumman Corporation

Office Of The Chairman
Chairman Jack Bierwirth
President John O'Brien
Vice Chairman-Finance Bob Freese
Vice Chairman-Technology Will Bischoff
Vice Chairman-Development Dan Huebner

Business: Oversees 10 Grumman divisions. Major departments include Washington Operations, Corporate Development, Secretary and Personnel, Finance & Treasurer, Corporate Research Center, Product Integrity, Public Affairs, and Audit.

Location: Headquartered in Bethpage, L.I.

Work Force: 206 people



A Taxing Year. *In headquarters, Vito Abbandandolo, tax accountant for the Corporate Tax Department, researches the Tax Reform Bill's impact on Grumman.*

Subsidiaries: Grumman Credit, Grumman International, Paumanock Development, Paumanock Insurance, Grumman Ohio, and Grumman Foreign Sales.
Work Force: under 50 people

On The Line. *If you like airplanes, the Calverton flight line is a great place to be. One of the critical jobs there is the plane captain's, who gets the craft ready for flights and makes sure they get the proper maintenance afterwards. Plane captain Carl Platti (above) handles A-6s and EA-6Bs.*

Aircraft Systems

Renso Caporali, President

Business: Designer and builder of military aircraft and aircraft systems. Includes systems integration, operations analysis, preliminary design and development, and the management of advanced and production programs. Major operational elements include engineering, manufacturing, testing and product support. Functions as both a prime systems contractor and as a major subcontractor in teaming arrangements.

Major Programs: Full scale development of A-6F Intruder and F-14D Tomcat; also F-14A and F-14A+, A-6E, C-2A Greyhound, EA-6B Prowler and E-2C Hawkeye.

Location: Headquartered in Bethpage, L.I., with facilities in Melville and Calverton, L.I.; Stuart, Florida; Glen Arm, Maryland; and Milledgeville, Georgia.

Work Force: 18,034 people

Total Grumman Population: 32,994

Average Age: 41

Average Years Of Service: 12

Aerostructures

Tom McGrath, President

Business: Subcontractor in the development, design, manufacture, and test of aircraft and space vehicle components and systems. In addition, modifies and supports out-of-production aircraft. Manufacturing work performed by Aircraft Systems' Bethpage Operations, Stuart Operations in Florida, Glen Arm in Maryland, and Milledgeville Operations in Georgia.

Major Programs: Folding wings for Penguin missiles; tail section and part of aft fuselage for V-22 Osprey; nacelles and thrust reversers for the G-IV and F-100; and wing and vertical fins for Israeli LAVI fighter.

Location: Headquartered in Melville, L.I.

Work Force: 248 people

T-squares Getting Rare. *Aerostructures engineers, like Donna Schilling-Weber, are giving up their drafting tables for computer scopes. This division is one of the heaviest users of computer-aided design equipment.*

Bumper Crop. *Tony Negolia welds the rear bumper for a Kurbmaster aluminum-bodied truck at Grumman Olson's Mayfield, Pennsylvania facility. In 1986, Olson built 12,200 Kurbmasters and other aluminum-bodied trucks at its four plants.*

Allied

Ron Peterson, President

Business: Producer of specialty vehicles and recreational marine products. Contains four operating units: Grumman Boats, Emergency Products (fire trucks), Long Life Vehicle (postal vehicle), and Olson (truck bodies).

Major Program: LLV, the U.S. Postal Service's new delivery truck. Allied will build 99,150 starting in April of next year.

Location: Headquartered in Bohemia, L.I., with facilities in Marathon, N.Y., and Arkadelphia, Arkansas, (boats); Roanoke and Vinton, Virginia (fire trucks); Montgomery, Pennsylvania (LLV); and Sturgis, Michigan; Mayfield, Pennsylvania; Sherman, Texas; and Tulare, California (truck bodies).

Work Force: 2,118 people

Data Systems

Bob Myers, President

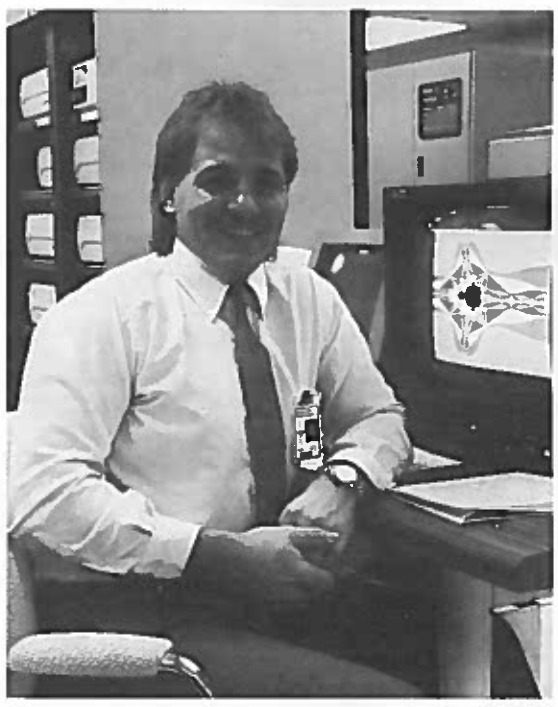
Business: Supplier of computing products and information systems, plus full range of maintenance and services support. Also operates major business and scientific computer facilities, and is primary provider of telecommunications and computer services and resources for all Grumman divisions.

Major Programs: Automated Telemetry Station at Calverton; designer of aircraft engine test system for Rolls Royce in England; supports engineering analysis and data system at NASA's Marshall Space Flight Center in Huntsville, Alabama.

Location: Headquartered in Bethpage, L.I., with facilities in Woodbury and Holtsville, L.I., and McLean, Virginia.

Work Force: 2,752 people

High-Tech Magic. *Senior programmer Robin Szybillo demonstrates a robotics simulation program created by the Data Systems Graphics Lab, Woodbury. The lab is now working on a teleoperation and robotics contract for NASA's Space Station.*



Round Trip. *For Bob Warta, a senior engineer on the Joint STARS program, Melbourne Systems' move to its new facility in Melbourne, Florida, is just a return home. He joined Grumman several months ago and came to work on Long Island while the new Florida building was being built.*

Melbourne Systems

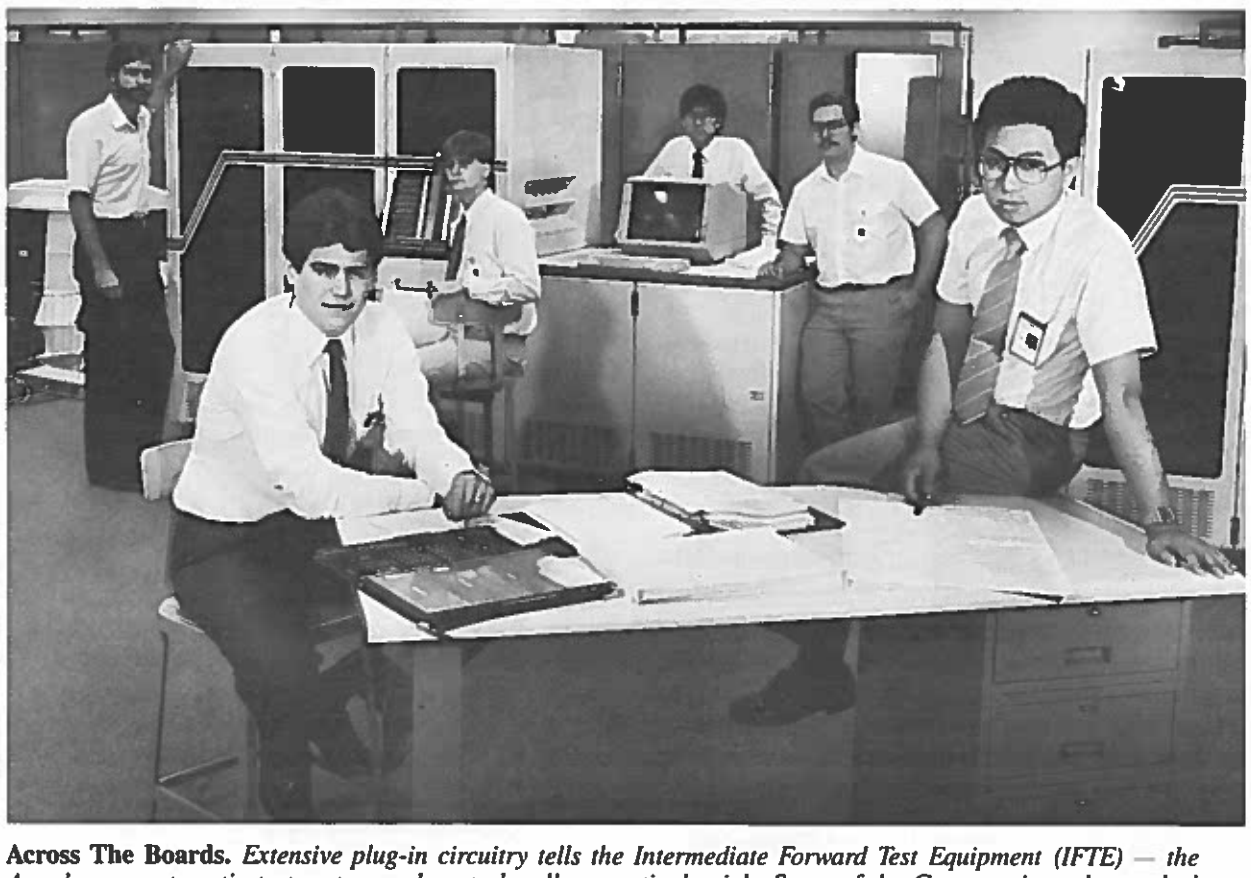
Al Verderosa, President

Business: Established when the Air Force selected Grumman as prime contractor for the Joint Surveillance Target Attack Radar System (Joint STARS), a system to be developed for the Air Force and the Army.

Joint STARS will fly aboard the E-8A — a modified Boeing 707. First flight is slated for the spring of 1988.

Location: Moving from Melville, L.I., to Melbourne, Florida, over the holiday break this year. A small core will remain on Long Island.

Work Force: 522 people



Across The Boards. *Extensive plug-in circuitry tells the Intermediate Forward Test Equipment (IFTE) — the Army's new automatic test system — how to handle a particular job. Some of the Grummanites who worked on IFTE are: (back, L-R) Fred Shepherd, Jim Harenberg, James Gee, Neil Erath, (front) Angelo Del Mistro, and Wai Tsang.*

Electronics Systems

Bob Nafis, President

Business: Designer and producer of high-technology electronic components, equipment, and systems for the military and commercial sectors. Contains seven business units: Program Products, Industrial Products, Guided Weapons Products, Display/Trainer Products, Test Equipment Products, Grumman Houston Corp., and Tachonics.

Major Program: Intermediate Forward Test Equipment, the U.S. Army's next generation of automatic test equipment.

Location: Headquartered in Bethpage, L.I., with facilities in Melville, Bohemia, and Great River, L.I.; Houston, Texas; Plainsboro, New Jersey; and Salisbury, Maryland.

Work Force: 2,657 people

Space Systems

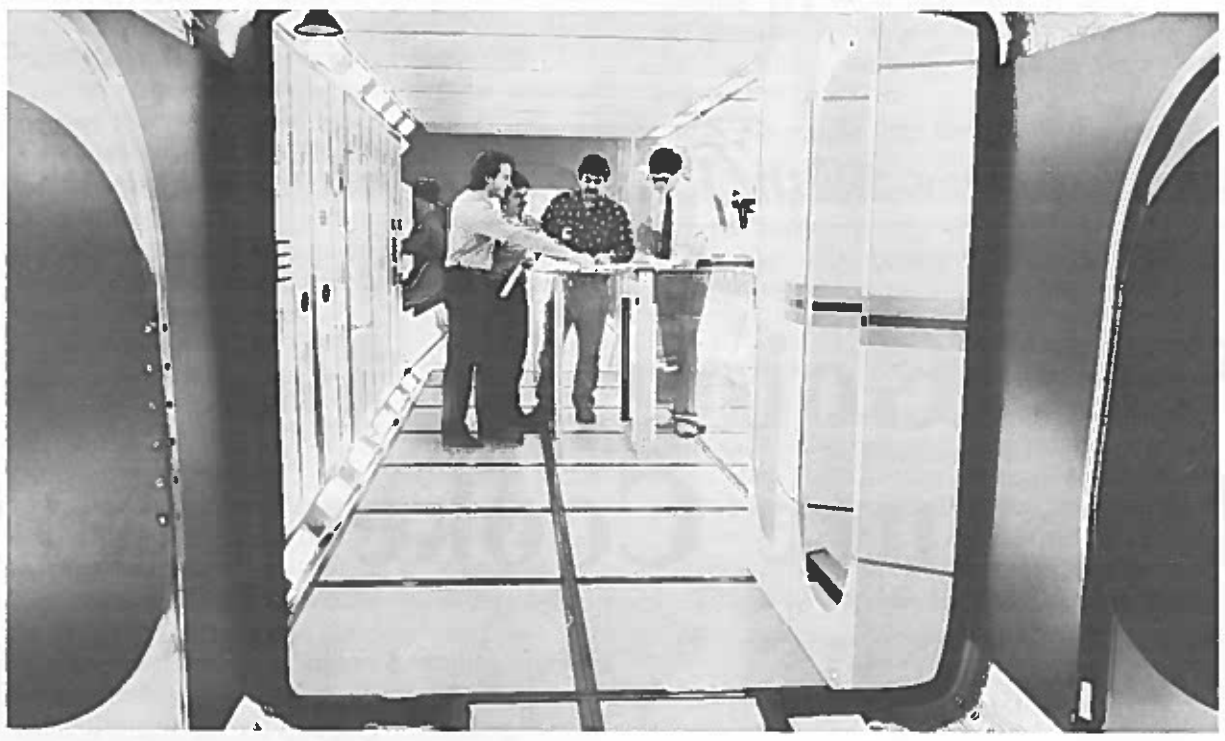
Alex Alexandrovich, President

Business: Designer and builder of space vehicles and systems for civil and military use. Prime customers are NASA and the U.S. Air Force. Serves as both prime contractor and major subcontractor.

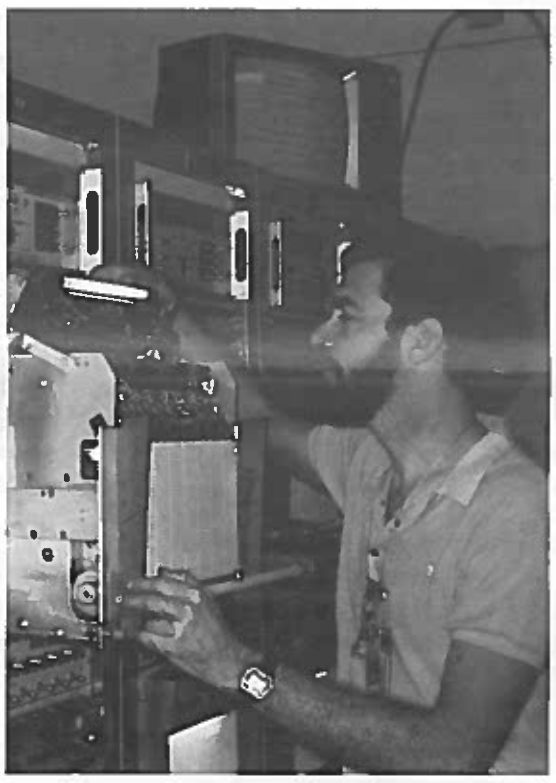
Major Programs: Subcontractor on two of four work packages to develop NASA's Manned Space Station; and developing Strategic Defense Initiative's boost surveillance and tracking system (BSTS) for the Defense Department.

Location: Headquartered in Bethpage, L.I., with facilities in Houston, Texas, and Irvine, California.

Work Force: 433 people



Sneak Preview. *At work inside the Space Station mockup in Building 5, Bethpage are John Safko, James Iannone, Kevin Kennedy, and John Duerr. Grumman built the mockup under a NASA study contract for work package No. 2. Grumman is a subcontractor to Rockwell International on the effort. The module is used to plan for habitat outfitting and extravehicular activity systems.*



Quiet Year. *Grumman technician Bruce Jacobs calibrates a strip chart recorder in the Kennedy Space Center (Fla.) launch complex. Launches have been postponed since the accident of the Space Shuttle* Challenger *in January.*

St. Augustine

Joe Walter, President

Business: Modifies, overhauls and maintains both Grumman and other manufacturers' aircraft.

Major Programs: Retrofits A-6 Intruders with Target Recognition Attack Multisensors (TRAM); overhauls A-6 wing outer panels.

Location St. Augustine, Florida

Work Force: 842 people

Fleet Ready. *At Grumman St. Augustine in Florida, Julio Torres finishes an overhaul of the A-6 Intruder's main landing gear. The division performs standard depot level maintenance on the Intruder for the Navy.*

Technical Services

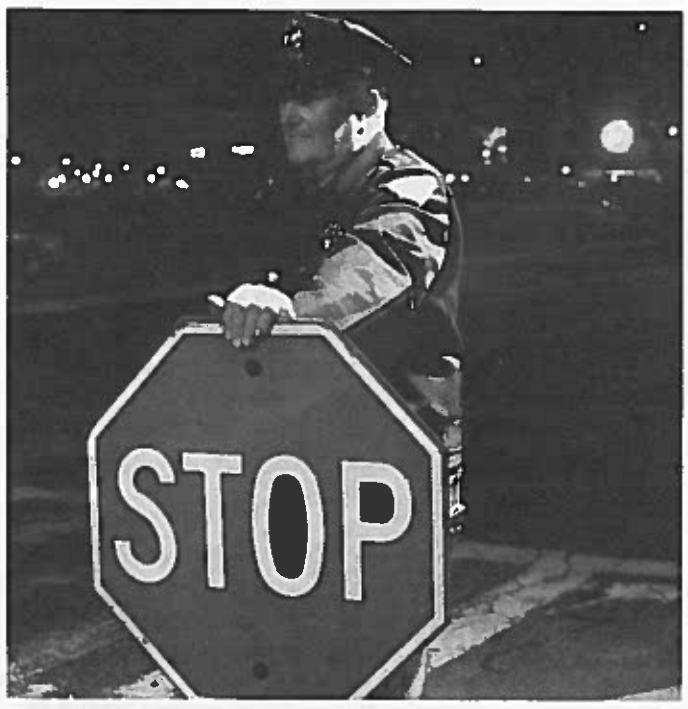
Fred Haise, President

Business: Provides service, overhaul, maintenance, repair and testing of aircraft, marine and space vehicles, along with their related support systems.

Major Programs: Subcontractor on the Shuttle Processing Contract; service contracts to maintain flight simulators and trainers and to support Grumman aircraft.

Location: Headquartered in Titusville (Florida), with installations at Kennedy Space Center, Florida; Vandenberg Air Force Base, California; and military installations around the world.

Work Force: 1,339 people



Goodnight Grumman. *Security guard Alfred Helm watches the gate at Building 2 in Bethpage. The folks from Corporate Security were pretty busy this year — in November, on Long Island alone, they issued 12,500 visitor's passes and made up 1,300 new employee ID badges.*

Services

Business: Provides commonly used services to other divisions and companies in Grumman Corporation. Includes Legal, Security, Facilities, Transportation, Corporate Procurement, Business Operations, and Personnel and Administrative Services.

Location: Headquartered in Bethpage.

Work Force: 3,260 people

An Interview With John O'Brien

'It's Going To Be A Pressure Cooker Year'

Recently, Grumman President John O'Brien talked with Grumman World *about the company's performance in 1986 and what lies ahead in 1987. Excerpts from that interview follow.*

Grumman World: *How did Grumman do in 1986?*

John O'Brien: On a scale of one to 10, I think we scored eight or nine.

In late 1985, we won IFTE (Intermediate Forward Test Equipment), the next generation of automatic test equipment for the U.S. Army. In the beginning of 1986, we won the Long Life Vehicle for the Postal Service.

We also won a study contract for the Boost Surveillance Tracking System; that competition is now down to three competitors and comes up for final review in the spring. Joint STARS is a little behind in some areas, but the scheduling of the first flight hasn't slipped. However, we did lose CASS (Consolidated Automated Support System) a few weeks ago.

GW: *What impact will the loss of the CASS contract have on the company?*

O'Brien: The loss obviously affects our automatic test equipment business. CASS was a significant part of the overall market, along with IFTE. We probably invested $13-15 million trying to win CASS, but that is not unusual in this business. We are very disappointed. But from the beginning, we were not sure we could win CASS on top of winning IFTE. And it turned out we didn't.

At the peak of the proposal effort about 150 people worked on CASS. In recent weeks, only a small group remained on the project, and these people have been reassigned to slots within ILS. Since CASS is not slated for fleet introduction until the mid-90s, our current ILS product line will continue for several more years.

GW: *Will Electronics Systems play a role in expanding Grumman's ATE product line?*

O'Brien: Electronics Systems was a major subcontractor to Aircraft Systems — so the CASS loss was a setback to them, too. However, they are concentrating on developing applications of the IFTE product for expanding Army ATE markets. This area looks very promising.

Remember: Electronics Systems is still in the "get started" mode. On a bottom line basis, they are not going to show any results for a while yet — but they are going right down the track that they laid out.

After a few minor setbacks, Tachonics has begun manufacturing gallium arsenide integrated circuits at its new location in Plainsboro, New Jersey. Great River Operations has undergone a major expansion; the Salisbury, Maryland., plant is up to speed; the new Benton, Pa., facility is now being built and should be operational by late summer.

GW: *What are some other areas of potential growth for the company?*

O'Brien: Data Systems has the potential to increase both sales and profits. Earlier this year, it acquired Arrow Electronics' computer maintenance group, which is working out well — and bringing a national presence to Data Systems. The division is also in the process of negotiating with Rolls Royce in England to design and build a computer-aided engineering system.

'The LLV contract will be a big shot in the arm for Allied next year.'

The LLV contract will be a big shot in the arm for Allied next year. The new factory in Montgomery (Pa.) is on schedule, and the vehicle's various preliminary and acceptance tests are going well.

In 1986, Olson truck body sales were higher than anticipated; profitability increased. Emergency Products did reasonably well, considering its low rate of production and some problems with its new aerial. Grumman Boats product lines have been very well received, and its sales have been increasing in recent years.

GW: *St. Augustine hasn't won a major aircraft modification program in the past few years. Will next year be a turning point for this division?*

O'Brien: Not for any major modification work, such as the Malaysian A-4 work completed last year. But we are putting some of the A-6 TRAM work down there and looking for additional re-wing work.

I expect St. Augustine to be relatively stable in 1987, with the potential for some additional mod work in 1988. They are in a cyclical business. In fact, the mod work that was forecast when we created St. Augustine did not develop — such as A-4 modification work for foreign countries.

GW: *What do you feel are Grumman's strengths?*

O'Brien: We begin 1987 with a $6.8 billion backlog.

The willingness to pull together to solve problems has been rekindled.

There is a better definition of the divisions and their authorities and responsibilities. There is always need for improvement, but it is significantly better.

GW: *What kind of a year will 1987 be?*

O'Brien: It's going to be a pressure cooker year. We have four tough development jobs — IFTE, F-14D, A-6F and Joint STARS. We must produce the LLV on schedule within target costs and quality goals. There will be increasing pressures to produce our current products more efficiently and to generate more profit. Every major competition will demand more up-front capital.

We've won the jobs; we have the talent. We just have to approach the task smarter. We are up against big competition. They have more money. We cannot afford to make mistakes.

GW: *Did Grummanites work smarter in 1986?*

O'Brien: We are getting better, but we have a long way to go. We have to think out the total perspective of the jobs we go after — and think them out cynically. The competition is getting more and more fierce; the customer is looking for tighter competitions.

There are lots of opportunities out there. We have to chase them more selectively, because the cost of competing is increasing. After you win, it's still costly — considering the new tooling rules, decreased progress payments, and the customer expecting up-front investments by the contractor.

'I think there are areas of productivity we haven't tapped yet.'

GW: *What about the Advanced Tactical Aircraft for the Navy?*

O'Brien: I can't comment any more than what was in the newspapers, since it is a classified program. Yes, we are teamed with Northrop and LTV; and, yes, it could prove to be a very exciting product.

GW: *Has the company worked out its problems with the computers in the F-14D?*

O'Brien: All of the technical solutions have been discussed with the Navy and with a team of experts the Navy brought in with our full concurrence. We all believe that we have a technical solution. Right now, we are in negotiations with the Navy to determine the full scope of these changes.

GW: *Grumman has been receiving 90 percent progress payments; however, Congress has lowered the percentage. What steps is the company taking to soften this blow?*

O'Brien: Currently, we are forecasting on the basis of around 85 to 90 percent progress payments, depending on our mix of contracts. The current government thrust is to reduce these payments to 75 percent. That increases the financing of existing programs significantly. It is an added interest payment that we have to pay and which we have no way of recovering on a government contract.

We will phase into it gradually because we have existing contracts with 90 percent payment schedules that run into 1987. Only the new contracts would fall under the 75 percent rate.

GW: *How will the cash crunch affect the average Grummanite?*

O'Brien: It will affect certain Grummanites more than others. Some research and development programs that people work on and think we should pursue probably won't survive.

Some capital investments will be deferred, especially ones that were not totally critical. Cosmetic improvement to facilities will really be stretched out. We'll put off doing most everything that doesn't generate a return.

I think the average Grummanite will see the impact in the form of pressures to increase productivity — to do more with the same or less. It's going to take every one of us — all 33,000 — to improve the productivity at Grumman.

For example, look at Aircraft Systems. Overall, considering the amount of work they have and are trying to digest, they are doing very well. They are turning out an awful lot of products.

However, I think there are areas of productivity we haven't tapped yet. It doesn't just mean manufacturing people should rivet faster and engineers should design faster. That's the old cliche. Inventory processing, scheduling and allocation of work space are all areas of productivity we don't normally think of. We are working on those areas.

In the last 10 years, we have invested $600 million to modernize the company — from office automation to new manufacturing tools — all ultimately designed to increase productivity in some form. I don't believe we have gotten full value out of that yet.

GW: *Grumman invested heavily in the future in 1986. Will this continue in 1987?*

O'Brien: It's on a downward trend. We have no choice but to reduce the size of our investments, because it's now time to turn the results of some of those past investments into products. That in itself requires capital.

GW: *How does Grumman decide what future technologies to pursue?*

O'Brien: That is pretty much in the hands of our technologists and development people. They make recommendations related to potential products.

Take the proposed hypersonic airliner. By the nature of its size and its intended use, we are not a prime contender for it. But that product will require new materials and new control technologies — perhaps new navigation technology. Our technologists will come to us and say what kind of a role we could play. They might describe a subcontractor role, maybe building a part of the wing or a nacelle, or what material technologies we could offer.

That's the genesis. Then, we determine how much money we have to invest to obtain a competitive position by a certain time. These technology tradeoffs are made annually, when we go over our research and development budgets and staffing requirements.

GW: *The people in Melbourne Systems are now moving to Florida. How is Joint STARS progressing?*

O'Brien: Joint STARS is doing very well when you consider the difficult challenge. We do expect to encounter the normal development problems. But I'm quite optimistic about Joint STARS.

The facility in Melbourne is coming along — it was finished four months ahead of schedule. The customer will also conduct its testing there. It's now a consolidated facility, which will save both the customer and Grumman money.

Melbourne Systems appears to have a high-spirited team. Everyone who was asked to transfer over the holidays is moving.

GW: *Has Space Systems begun moving its civil space group to Houston?*

O'Brien: Some people will be in Houston just after the first of the year and more will transfer soon thereafter. That's a move that we analyzed very carefully.

Number one: it puts us very close to our customer, NASA. Number two: it puts us into an area where there is engineering talent available. And number three: it vacates some work space that is now available for other work on Long Island.

GW: *Is this a trend that will continue as Grumman expands?*

O'Brien: Definitely. We have to do it to survive. We have to accept change if we are going to continue to grow in this business. Our competitors' people are willing to move. If we are not willing to move, we impact our competitive position.

Some people who have been asked to transfer are struggling with the decision and I respect that. We try to help them. We don't force anyone, and we do our best to accommodate people — but we do believe that to remain competitive we must have a more mobile work force.

GW: *What about Grumman's skill mix for 1987?*

O'Brien: In some areas of manufacturing, our skills mix is changing, as it is in some engineering fields. We are ending some programs, and starting others. There will be some transfer or re-training of people, as our needs change.

'We have to accept change if we are going to continue to grow in this business.'

GW: *Will there be a reduction-in-force?*

O'Brien: At the moment I don't foresee any need for layoffs. In some areas where the skill mix creates overstaffing, we believe attrition will handle it.

GW: *Did Grumman's image change in 1986?*

O'Brien: I'm not sure that it has changed significantly. We want to be seen as a more assertive, tightly controlled business. We are headed in that direction. We are trying to change people's perception of the company as only the "Grumman Ironworks." As we take on more and more electronics and systems jobs, we're becoming an electronics and systems integration firm. It's a long, slow process, but we are making our mark.■

Leaning into the wind and jet blast, a catapult officer launches an F-14A Tomcat from the deck of the U.S.S. Enterprise. The Navy will begin taking deliveries of the new F-14A+ with its more powerful engines next year. (Photo courtesy of U.S. Navy)

A Financial Report

How Much Money We Earned

Results for the first nine months of each year

	Net Sales	Net Income
1986	$2,571,272,000	$53,867,000
1985	$2,266,952,000	$58,410,000

Backlog

1986
$6.8 billion*

1985
$5.6 billion

**Orders under negotiation are included only to the extent funded; accordingly, the backlog for 1986 does not include an unfunded amount of approximately $402 million for development work on the F-14D upgrade program. Backlog figures are as of September 30, 1986.*

How We Spend The Sales Dollar

Based on an average year

Material	*35 ¢*
Purchased items and products needed to produce our products	
Salaries	*33 ¢*
Operating Costs	*18 ¢*
Energy, supplies, depreciation, maintenance and misc.	
Fringe Benefits	*8 ¢*
Vacations, medical plans, pension, etc.	
Federal taxes	*2 ¢*
Interest Expense	*1 ¢*
Profits	*3 ¢*
Dividends	*1 ¢*
Paid out to shareholders from profits	
Retained earnings	*2 ¢*
Profits less dividends	
	$1.00

Stack Of Chips. *Implant specialist Ken Petrocelli is making gallium arsenide wafers, which will be used in advanced integrated circuits. The Electronics Systems Division's new Tachonics unit will soon begin production of these circuits.*

Your Hidden Paycheck

Your "Hidden Paycheck" — those benefits that don't turn to cash when you take your check to the bank — amounts to about 40 percent of your base salary.

In 1986, Grumman's payroll will be about $1 billion. Another $407 million will be spent on health coverage, life insurance, vacation time, short- and long-term disability, employee services functions, Social Security and other benefits. Two of the most important are the Pension Plan and the Employee Investment Plan.

About 24,200 Grummanites are members of the Grumman Pension Plan. Grumman Allied, however, has its own plan. Grumman St. Augustine, Grumman Technical Services, and Electronic Systems' Salisbury Operations and Tachonics units have capital accumulation plans. Other groups have profit-sharing plans or other plans as appropriate. The company contributes toward the accounts of the Grummanites in those groups. When they retire, they are entitled to the value of their accounts either in a lump sum or in installments.

The Grumman Pension Plan is a "defined benefit" plan. The amount of any pension is determined by a specific formula. Grumman raises or lowers its contributions to the plan each year to keep the plan's assets at a level that matches any present and future obligations.

This year the company planned to contribute about $55 million to the plan. This and past contributions are invested. The overall return on these investments could be over $100 million this year.

The plan's total assets at the end of this October were over $1.7 billion.

About 9,200 people are drawing pensions. Last year retirees and other beneficiaries received benefits of more than $48.6 million under various payment options.

Retirement income can be derived from three sources: the pension plan, Social Security, and personal savings.

One of the popular and productive ways to save for retirement is through the Grumman Employee Investment Plan. EIP was established in 1965 as a long-term savings plan.

The EIP's big attraction is the company match, which changes every three months. For the first three months of 1987, the matching rate will be 59 percent. For each matchable dollar, participants will get another 59 cents.

In 1985, a year when the matching rate was 100 percent, Grumman's total match was about $25 million. This year the match opened at 82 percent and dropped to 58 percent by the last quarter. Still, Grumman could add about $20 million to the accounts of participating Grummanites.

In 1985, Grummanites invested over $53 million in the EIP; that number is expected to reach $60 million this year.

Participants can invest their money in the Company Stock Fund, the Equity Fund, the Fixed Income Fund, and the Guaranteed Income Fund.

In 1985, return on investments in the Equity Fund was 25 percent, a year when the stock market made heavy gains. The Fixed Income Fund returned about 22 percent in 1985 and could hit 15 percent this year — about the same as its return in 1984. The Guaranteed Income Fund returned 11.2 percent this year; in 1987, the interest will be 11 percent.

One more choice that EIP members have is the Deferred Compensation Option, which allows a participant to defer income taxes on today's EIP investments. Right now, 12,603 Grummanites are taking advantage of this option. ■

Where Are We Saving Our Money?

Market values of the EIP funds as of September 30, 1986

Fixed Income Fund	**$48,634,021**
Equity Fund	**$76,994,110**
Guaranteed Income Fund	**$310,185,368†**
Company Stock Fund	**$267,282,261‡**

† This includes money contributed by Grumman as investments for the capital accumulation plans
‡ Includes employees' contributions and the Grumman matching contributions

PAYSOP

Number of shares	**690,959**
Market Value	**$17,274,000**

Note: 33,400 employees have PAYSOP acounts. The PAYSOP figures are projected to the end of this year. Due to the provisions of the Tax Reform Act of 1986, PAYSOP contributions to individual employee accounts will cease as of December 31, 1986. However, all PAYSOP accounts will remain open and active until further notice.

Grummanites Punch Away At Several Thousand Computers

In 1987, Grumman plans to tie together its many PCs, shared minicomputers, and mainframes

Grumman is a long way off from having a computer terminal on every desk, but every year more and more Grummanites join the keyboard generation.

Today, there are about 350 IBM Displaywriters — word processors — and over 1,300 IBM personal computers (PCs) being used by Grummanites. People in the engineering world are heavy users of the Apple MacIntosh; there are nearly 150 of these PCs in Aircraft Systems and Space Systems divisions alone.

Distributed systems — central processors accessed from a number of terminals — serve several thousand Grummanites. There are 25 Wang VS series minicomputers helping some 1,500 Grummanites. The big IBM mainframes make light work of office work for about 2,000 people.

"This year we have been trying to get people to switch from IBM Displaywriters to personal computers or to shared systems," says Judy Galgano, manager of Office Systems and PC Technology in Office Automation. IBM no longer manufactures Displaywriters, so support is expected to slowly drop.

But more important than that, says Galgano, PCs and shared systems such as Wang minicomputers can do more for Grumman users.

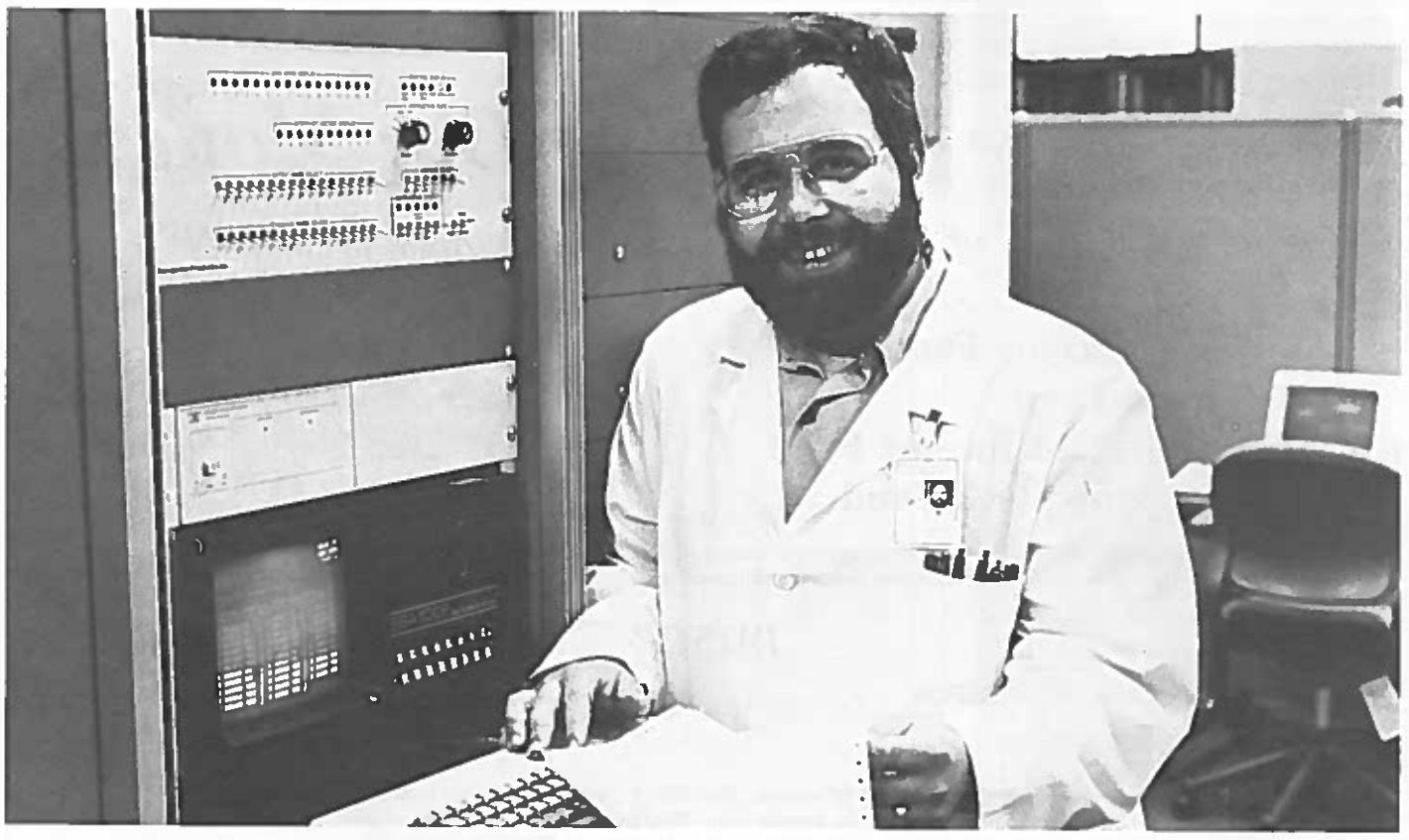
"We found over the past year that 70 percent of the work people are doing on their Displaywriters is word processing, 30 percent is data management."

Galgano says that shows how creative people can be, because Displaywriters weren't built for data management. "People made their Displaywriters do a lot more than they were designed to do."

Many Hewlett-Packard and DEC VAX computers are dedicated to scientific and engineering work. In 1987, one goal is to see if these can provide some office automation services as well.

Another goal will be to try to interconnect all the computers at Grumman. "The company has a lot of pockets of automation," Galgano points out. "We want to let people communicate between those pockets. Early next year we plan to look at some software that will help us accomplish this."■

Automated Feats. *Data Systems technicians Scott Murphy (above) and Tom Zambito (R) install a 9,600 kilobits-per-second data link in Melbourne Systems' office in Melville, Long Island. The line will let Grummanites and their customer at Hanscom Air Force Base, Massachusetts, send electronic mail to each other. In Building 117, Bethpage, Aircraft Services' secretary Marie Sebold (photo at R) and systems analyst Pat Stapleton (L) use a Hewlett Packard computer for word processing.*



Screen Test. *At Calverton, technician Luigi Giordano (above) is helping to build the A-6F Systems Integration Test Station. The station will consist of the actual A-6F displays, controls, mission computers, navigation equipment, and stores management systems.*

Changing Tools Of The Trade

While it's not office automation in the strict sense, more and more Grumman engineers are leaving their drawing tables and pencil sharpeners for the computer screens and light pens of GEMS: the Grumman Engineering and Manufacturing System.

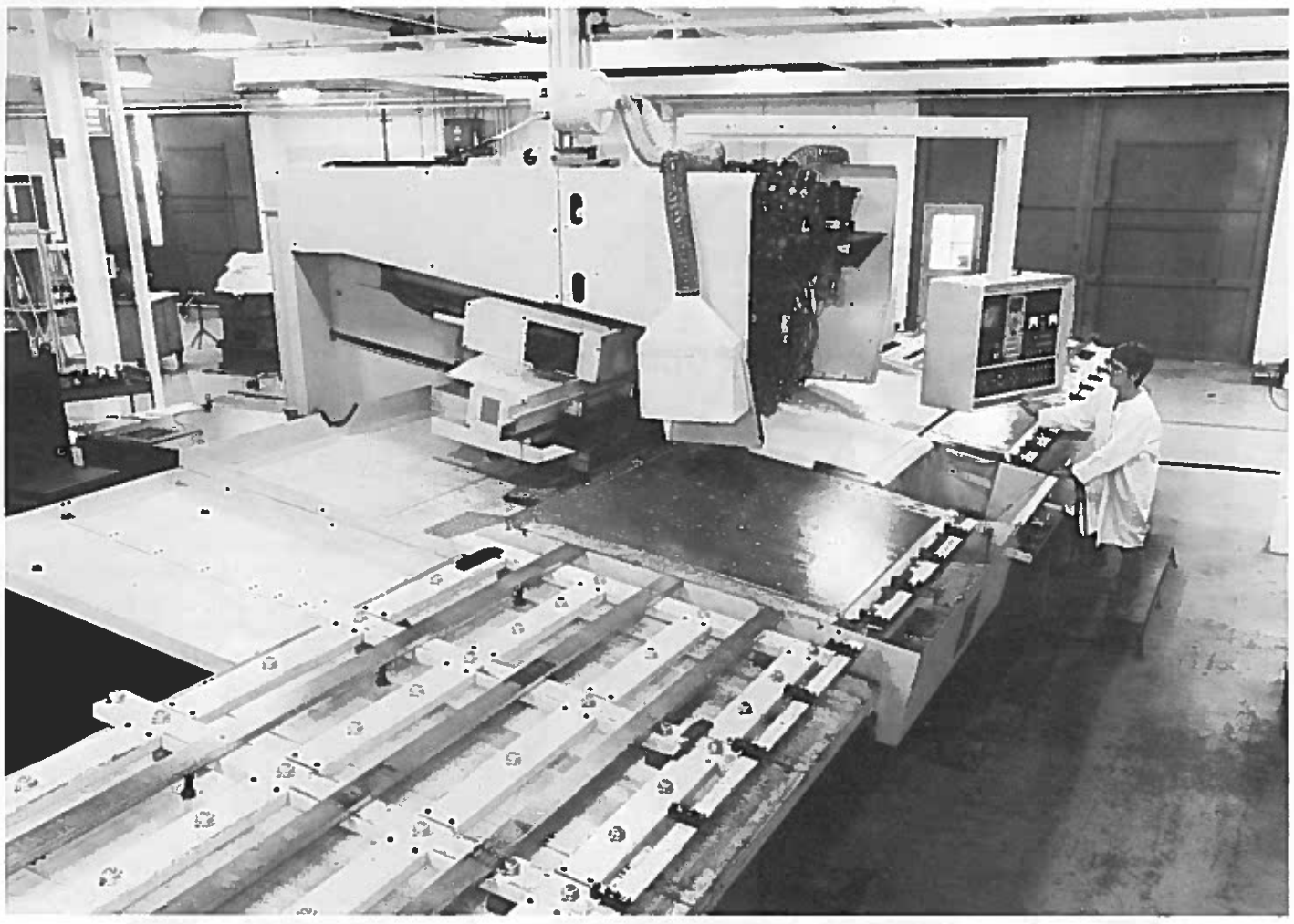
At one end the engineer creates the design on a scope. GEMS then transfers that data to the manufacturing world.

In 1977, Grumman installed its first four GEMS scopes. The number grew to almost 500 in 1986, with nearly half located in Melville.

The Allied Division uses a computer-aided design system at Grumman Olson in Sturgis, Michigan, to design truck parts. The division has a similar system in Bohemia, Long Island, for the LLV.

Aircraft Systems' production areas, too, are becoming highly automated, not only in terms of machinery. Before and after working on parts, for example, Grummanites in Manufacturing run their ID badges through Cost Tracking System (CTS) units, as a cashier in a department store would a credit card. Then, with a light pen, they input data that's bar-coded on tags on the parts. The information helps monitor and manage the flow of work.

Over 2,500 people in Manufacturing are using CTS.



Brand New Skill. *Carole Gehnrich, numerical control router operator in Warehouse 9, Bethpage, learned how to use this machine when it arrived at Grumman late last year. The machine makes parts by drilling, rivetting and routing sheets of aluminum.*

Modernization Continues At Grumman In '86

Grumman spent about $170 million in new equipment and buildings this year

The company's surge to modernize its facilities and equipment over the last several years promises increased productivity and future business growth.

Under Grumman's five-year capital improvement program, the company added over $625 million in new buildings and equipment from 1982 through 1986. In 1986, about $170 million was spent.

However, the program will continue into 1987 and 1988 due to contractual and new business requirements. Many projects under the program will receive limited funding next year due to the tight cash situation in the company.

A large portion of the expenditures is for the Aircraft Systems Division's manufacturing modernization program.

The 1981 plan called for a total budget of $137 million to be spent over a five-year period. Through year-end 1986, $110.5 million has been approved.

A switch in duties has taken place in Building 2 and 3. Building 3 is now specializing in sheet metal detail part manufacturing, while Building 2 will be used for assembly operations. A few years ago, production machining and metal bonding were moved to Glen Arm, Maryland, and Milledgeville, Georgia, respectively.

One of the major projects under the modernization plan approved this year was the $9.4 million detail part paint facility in Building 3. A $4.3 million hard-rubber, high-pressure forming press that bends sheet metal parts around forming blocks is on the 1987 agenda.

Also funded under the capital investment program is Electronics Systems' Salisbury, Maryland, facility, which was dedicated in September, 1986. Grumman spent $2.7 million to convert an old shirt factory into an electrical assembly operation. Since the doors opened a year ago, about 6,000 wire harnesses have been produced by the 300 Grummanites at Salisbury.

A groundbreaking ceremony was held in September for another new Electronics Systems operation, this one in Benton Township, Pennsylvania. The $9.5 million facility will open in 1987 and will make printed circuit boards.

A new Automated Telemetry System in Calverton finished the first step of a $8.3 million upgrade: a new computer network.

Although it is only one-third complete, the new ATS system was ready for the first F-14A+ flight in September. The ATS receives information from sensors placed throughout planes being flight tested, enabling engineers to analyze what's going on in the plane's structure, electronics systems and engines. The upgraded ATS will be fully operational by the end of 1987, in time for the flight tests of the F-14D and A-6F.

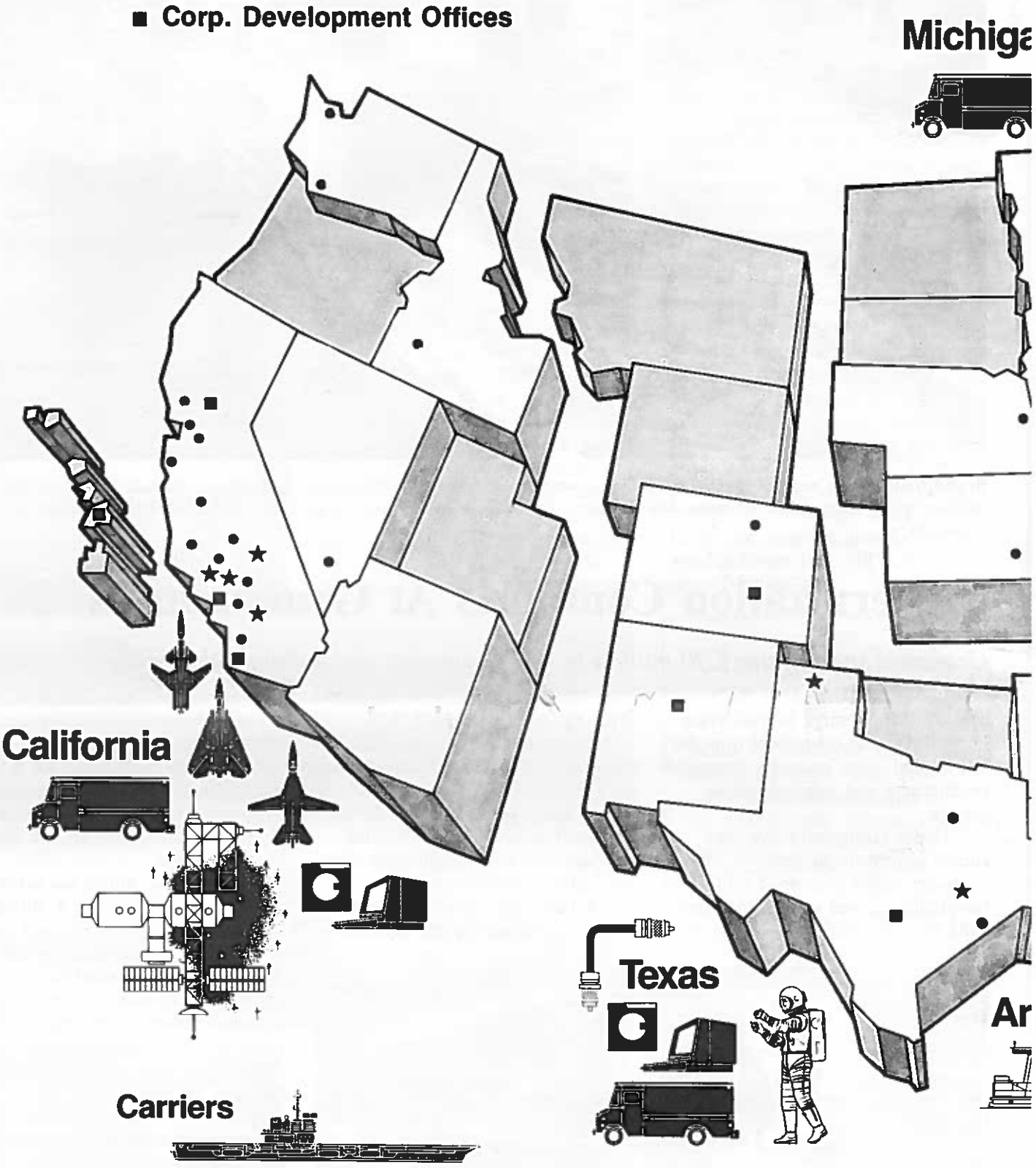
Under a $1.1 billion contract with the U.S. Postal Service, Grumman will begin building 99,150 Long Life Vehicles (LLVs) at its facility in Montgomery, Pennsylvania. The Allied Division has committed $21 million to remodel and enlarge the facility and purchase equipment in 1986. LLV production will begin in April, 1987.

Another investment in the future is the company's new Melbourne, Florida, laboratory and office building. About 200 Long Island Grummanites are now relocating there.

The Grumman Melbourne Systems Division will initially handle the Joint STARS program for the Air Force, but the facility will be the logical home for future systems engineering programs.■

Staying On Top Of Technology. *Dave Hornung (above) is part of a Grumman Data Systems team that is upgrading the Automated Telemetry System in Calverton, L.I. Cathy Grastataro (at R), tool designer in Bethpage, helped design this 18-foot sine wave spar mold — the largest spar in the world to date. Under intense heat and pressure, this tool molds graphite cloth into a piece used in the V22 Osprey empennage.*

Where We Are



Alabama
•Data Systems, Huntsville

Arkansas
★Grumman Boats (Allied), Arkadelphia

California
■Corporate Regional Office: Western, Los Angeles
•Aircraft Systems, NAS Alameda
•Grumman Systems Support Corp. (GSSC), Data Systems, Carson
•Aircraft Systems, Edwards Air Force Base
•Aircraft Systems, NAS North Island
•Aircraft Systems, MCAS El Toro
•Grumman Olson (Allied), Fresno
★Space Systems, Irvine
•Grumman Emergency Products (Allied), Pittsburg
★Aircraft Systems, Pacific Missile Test Center, Pt. Mugu
•Aircraft Systems, Naval Weapons Center at China Lake
■Corporate Development, Sacramento
•Aircraft Systems, NAS Miramar
•Data Systems, San Diego
■Corporate Development, San Diego
•GSSC (Data Systems), Sunnyvale
★Grumman Olson (Allied), Tulare
★Technical Services, Vandenberg AFB
•GSSC (Data Systems), Walnut Creek

Colorado
•GSSC (Data Systems), Aurora
■Corporate Development, Colorado Springs

Connecticut
•GSSC (Data Systems), Wallington

Florida
•Grumman Olson (Allied), Coral Springs
•Aircraft Systems, Ft. Walton Beach
•Technical Services, NAS Cecil Field
•GSSC (Data Systems), Kennedy Space Center
★Melbourne Systems, Melbourne
•Aircraft Systems, NAS Key West
■Corporate Development, Orlando
★Grumman St. Augustine, St. Augustine
★Aircraft Systems, Stuart Operations
★Technical Services, Titusville

Georgia
■Corporate Regional Office: Southeastern, Atlanta
•Data Systems, Albany
★Aircraft Systems, Milledgeville Operations
•Aircraft Systems, Warner Robins

Hawaii
■Corporate Development, Honolulu

Idaho
•Aircraft Systems, Mountain Home AFB

Illinois
■Corporate Regional Office, Des Plaines
•GSSC (Data Systems), Elmhurst

Indiana
•Aircraft Systems, Naval Weapons Support Center, Crane

Kansas
•Melbourne Systems at Boeing Military Airplane Company, Wichita

Louisiana
•Aircraft Systems, New Orleans

Maryland
•Grumman Boats, Annapolis
•Grumman Olson (Allied), Chestertown
•Aircraft Systems at Litton Industries, College Park
•GSSC (Data Systems), Gaithersburg
★Aircraft Systems, Glen Arm
•GSSC (Data Systems), Linthicum
•Aircraft Systems, Naval Air Test Center, Patuxent River
★Electronics Systems, Salisbury
•Technical Services, Upper Marlboro

Massachusetts
■Corporate Development, Lexington
•Grumman Olson (Allied), Wellesley Hills
•GSSC (Data Systems), Woburn

Michigan
★Grumman Olson (Allied), Sturgis
•GSSC (Data Systems), Troy
•Grumman Boats, White Pigeon

Minnesota
•Grumman Boats, Brainerd

Missouri
•GSSC (Data Systems), Maryland Heights

Nebraska
•Data Systems, Bellevue

Nevada
•Aircraft Systems, Las Vegas

New Jersey
•GSSC (Data Systems), Fairfield
•GSSC (Data Systems), Moorestown
★Tachonics (Electronics Systems), Plainsboro
•Aircraft Systems, Princeton

New Mexico
■Corporate Development, Albuquerque

New York
★Grumman Corp., Bethpage and Bohemia
★Aircraft Systems, Bethpage, Calverton, and Melville
★Data Systems, Bethpage, Holtsville, Calverton, Woodbury
★Grumman Boats, Marathon
★Aerostructures, Melville
★Allied, Bohemia
★Electronics Systems, Bethpage, Great River and Melville
•GSSC and InfoConversion (both Data Systems), New York City
•GSSC (Data Systems), Rochester
•Data Systems, Troy

North Carolina
•Aircraft Systems, MCAS Cherry Point

Ohio
•GSSC (Data Systems), Bowling Green
•GSSC (Data Systems), Centerville
•GSSC (Data Systems), Cincinnati
■Corporate Development, Dayton
•Grumman Olson (Allied), New Albany
•GSSC (Data Systems), Strongsville
•Grumman Ohio Corp., Worthington

Pennsylvania
•Grumman Olson (Allied), Jenkintown
★Grumman Olson (Allied), Mayfield
•GSSC (Data Systems), Monroeville
★LLV (Allied), Montgomery
•GSSC (Data Systems), Norristown
•Aircraft Systems, Aviation Supply Office, Philadelphia
•Aircraft Systems, Warminster

Rhode Island
•GSSC (Data Systems), East Providence

South Carolina
•Data Systems, Charleston

Tennessee
•Data Systems, USAF Arnold Engineering Development Center
•Space Systems, Oak Ridge National Laboratory

Texas
•Grumman Olson (Allied), Dallas
•GSSC (Data Systems), Houston
•Technical Services, NASA Johnson Space Center, Houston
■Corporate Development, San Antonio
★Grumman Olson (Allied), Sherman
★Grumman Houston (Electronics Systems), Webster

Virginia/Washington, D.C.
•Grumman Corporation, Arlington
★Grumman-CTEC (Data Systems), McLean
■Corporate Development, Hampton
•Aircraft Systems, NAS Norfolk
•GSSC (Data Systems), Richmond
★Emergency Products (Allied), Roanoke
★Emergency Products (Allied), Vinton
•Aircraft Systems, NAS Oceana

Washington
•GSSC (Data Systems), Bellevue
•Aircraft Systems, NAS Whidbey Island
•Grumman Olson (Allied), Woodland

Canada
■Corporate Regional Office: Canada, Enfield, Nova Scotia

International
•Tel Aviv, Israel
•Paris, France
•Singapore
•Taipei, Taiwan, Republic of China
•Tokyo, Japan

What Business Is Grumman In?

By Robert Sobel

More than 40 years ago management guru Peter F. Drucker startled the General Motors board by asking a deceptively simple question: "What business are you in?" Out of this came a thorough examination of the corporation and its slow and painstaking restructuring. GM remained GM, of course, but adaption to change and ongoing re-creation of the entity became a paramount consideration. Astute managements continually ask such questions, and occasionally invite an outsider to poke around the firm, observe, formulate ideas, and then report on what has been seen. What follows is the result of one such foray.

Tradition And Change

Modern corporations oscillate between clinging to tradition — which can be comforting — and adjusting to rapid change — often a painful ordeal. Firms that stress the former are destined to petrify, permitting opportunities to pass them by, while those that ignore or reject tradition run the risk of alienating elements that contributed to their successes.

Ponder the fate of Central Leather, one of America's largest corporations in 1900, when its product was in great demand for bridles, harnesses, and belting to transmit power from steam engines to all sorts of factory equipment. In came the automobile and the electrified factory, and out went Central Leather in 1928, bankrupt because management refused to adjust to the new dispensation.

"We are steel men," said an executive at Republic Steel in 1960, who scoffed at the idea of diversifying into other products as markets dwindled. Today Republic Steel is an ailing division of the bankrupt LTV Corp.

It can go the other way too, when firms wander around in an amnesic fog, rejecting the very elements that led to past successes. "We are in the business of managing assets, acquiring promising ones, shucking off those that no longer qualify in terms of return on capital," was the boast of the CEO at U.S. Industries, one of the go-go conglomerates of the 1960s — which is no longer with us. "I'm in the business of making profits, not steel," said CEO David Roderick of what then was U.S. Steel. To indicate as much, the company was renamed USX this year —the X selected because that is the firm's New York Stock Exchange ticker symbol; Roderick is more interested in the stock market than the steel market. At this writing, USX is being sought after by several raiders, and if one or another succeeds he will probably carve it up and dispose of the parts.

What About Grumman?

A generation after Drucker studied General Motors, Litton Industries co-founder Roy Ash announced the acquisition of Ingalls Shipbuilding, a rather moribund operation based in Pasaguola, Mississippi, whose major asset was a contract to construct submarines for the U.S. Navy. Why would a burgeoning conglomerate, which often talked of the "synergy" between its parts and delighted in restructuring managements, want Ingalls, which had no apparent relationship to any of them? Ash provided the answer: "A submarine is the most expensive hotel in the world." As Ash saw it; the ships would be akin to metal boxes into which other parts of Litton could place their sophisticated electronics gear.

All of this contains important messages, which Grumman's management and work force appear to understand. In 1968, when revenues came to less than $1 billion, the answer to the question, "What business is Grumman in?" might have been, "Grumman designs and manufactures military and commercial aircraft, spacecraft, and oceanographic vehicles," which was the way Standard & Poor's put it. Indeed, the same could be said of the firm today: Value Line thinks of Grumman as "the largest domestic producer of carrier-based aircraft."

So it is. But as with Roy Ash, President John O'Brien also sees an airframe as a container into which Grumman is pouring sophisticated electronics, products which loom significant in the company's future. What business is Grumman in? The answer includes airframes, but increasingly it will be electronics.

Consider some striking figures. In 1944, Grumman delivered 6,133 Hellcats to the U.S. Navy, which came to almost 17 a day. Over a typical weekend, 24 Hellcats rolled onto the Bethpage tarmacs. It so happens this is exactly the number of F-14s the company will produce in all of 1986.

Now consider the matter of price. The Hellcats cost the Navy $65,000 a copy; the F-14s fetch an average price of $23 million each.

Grumman planes evolve like the old Volkswagen Beetle, always improving, though the outward appearance hardly changes.

The difference between the Hellcat and the F-14 is just as striking as that between IBM's electromechanical sorters of the World War II era and today's giant mainframes, which is to say both of today's products have become examples of state of the art high technology.

Perhaps one reason the general public doesn't realize this is because the airframes look the same now as they did years ago. Take the E-2C Hawkeye, for example. Jerry Norton, who recently became director of Systems for the Melbourne Systems Division, had been head of the systems engineering group on the E-2C program and worked on the original E-2 in 1959. He observes that they will be coming out of the Bethpage hangars well into the next century, though in different configurations.

Planes are delivered to the Navy in blocks, with each in the group the same as the others. But the next block will contain improvements. Says Norton, "As the technology permits, new capability is added. The Hawkeye has basically the same mission that it did at the beginning of the program, but there have been major upgrades every five years or so." It makes little sense to discard a perfectly workable airframe when improvements in electronic capabilities can deliver greater performance. Thus, the E-2 — and the F-14 and other Grumman planes — evolve like the old Volkswagen Beetle, always improving, though the outward appearance hardly changes.

This is why the greatest effort in the E-2 program now goes into electronics. In 1970, the plane's software had 525,000 bytes of memory; 10 years later the memory was at 1,000,000 bytes. The radar has gone through eight major changes. The initial E-2s had limited capabilities; today, a single E-2C flying at 30,000 feet can monitor every aircraft flying in the Boston-New York-Washington corridor.

This is hardly the kind of product expected from a company some still consider a "metal bender" that could turn out product well enough,

In The Chips. *The next generation of computers will rely on integrated circuits of gallium arsenide instead of silicon. The Tachonics unit of the Electronics Systems Division will soon have a slice of this new market. Tachonics has already produced its first successful preproduction circuits. Here, process engineer Wazid Rizvi places gallium arsenide wafers into an evaporator.*

but wasn't proficient when it came to research and development.

Nothing riles O'Brien more than the fact that this startling evolution isn't given its proper due. Correcting this misconception is one of his major concerns. "This a painful problem," he says. "We are trying to change our image and still retain the vital core of the company. It is a good thing to change your image if it's in support of product line changes. But not if it changes your style."

The Electronic Enterprise

Fred Ballard, Data Systems' manager of Advanced Networks, heads a team that investigates the latest available technologies and applies them in innovative ways to the complex, integrated systems that this division builds. Data Systems' major customers are the military and the National Aeronautics and Space Administration. Grumman seeks additional customers, and wants to sell more to current ones. The competition includes the likes of General Motors' Electronic Data Systems, TRW, Raytheon, and Ford Aerospace. Data Systems was created to give Grumman a start in the computing systems business. While most of its projects in the formative years supported programs in other units of the Grumman Corporation, Data Systems has taken on a life of its own. It's working even better than anticipated; shortly, Data Systems will generate more business outside of the firm than within it.

According to consensus estimates, electronics and electronics-based enterprises will be equal in size to airframes by the beginning of the next decade. The corporation is quite clear and candid about its vision of the future. Last year's annual report to shareholders stated: "Over recent years, what has differentiated Grumman from other companies has been our ability to develop complex airborne electronics systems." The Electronics Systems Division accounted for $220 million in sales last year; the corporation plans to better than double this amount by 1990. According to one Wall Street estimate, Data Systems, a $245 million operation in 1985, will top $650 million by then. Taken together, these two divisions may surpass Grumman's aircraft business by the early 1990s.

The Management Of Change

Central to this redirection of the corporation is the need to preserve those elements that made Grumman a successful enterprise, while preparing it to meet new challenges. This is what economist Joseph Schumpeter once called "creative destruction," the shedding of the past to create the future, cutting away the fat while not slicing into the meat and bones.

Grumman strives to build upon the best of its tradition and play to strengths, while seeking to recreate the firm to capitalize upon the technologies it possesses and meet the need of its customers — especially the U.S. Department of Defense. The company struggles on a daily basis to answer what on the surface appears a simple question: "What do we do with what we have, and what will we need to do it better?"

Shortly, Data Systems will generate more business outside of the firm than within it.

Jack Bierwirth, who became board chairman in 1975, strove to develop programs to meet the needs of the Defense Department, utilizing the capabilities created during the Lunar Module program. Even then, Grumman was advancing to the forefront of the electronics industry.

The company is hardly in a unique situation; many defense companies are moving in this direction. Firms in electronics are trying to get into systems, and vice-versa. The trick will be to go at it faster than the others.

Collecting Material. *Author Bob Sobel interviews Janet Soley, an Industrial Modernization project leader for Aircraft Systems in Building 3, Bethpage.*

About The Author

Robert Sobel, who wrote this article for *Grumman World* , is the author of several books about business, including "IBM"; "Saloman Brothers — 1910-1985"; and "The Entrepreneurs," a study of American doers and movers. His current project is a history of Anheuser Busch.

In addition, Sobel writes a financial column for the Long Island daily *Newsday* and teaches business history at Hofstra University's New School. Born in the Bronx, he lives in Massapequa, Long Island.

All of the problems are complex, but fall into three interrelated categories: technological, financial, and human.

While remaining an important prime contractor for military aircraft, Grumman is by no means able to throw its weight around in this arena. Aerospace/defense is a big ballground — approximately $115 billion in sales are estimated for 1986. Large segments of this market are dominated by a handful of customers. A major contract to supply an airline with passenger planes can occupy a manufacturer (and there are only three big ones remaining) for decades, while failure can devastate the work force. It is even rougher in the defense area, which is monopsonistic, meaning there are a number of suppliers and only one buyer — the U.S. Government — which sets just about any rules it cares to.

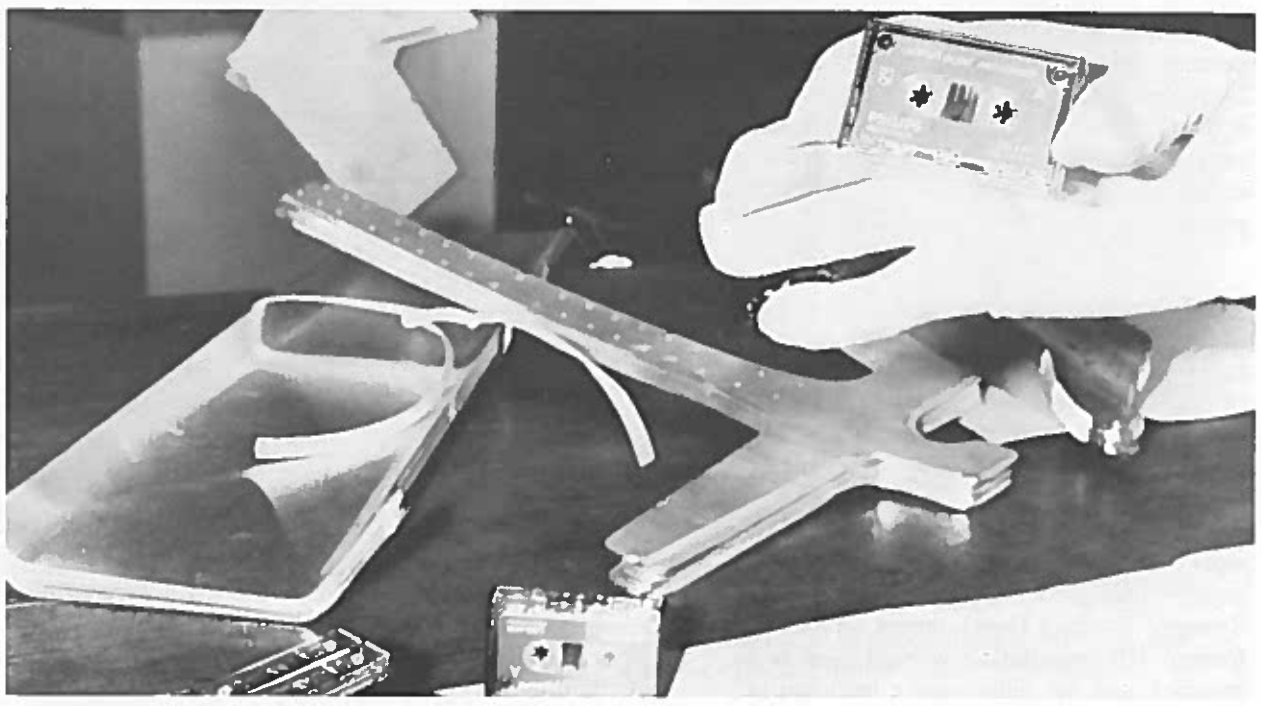
Today's Grumman is a $3 billion-plus company which, according to Fortune, stands 131st in size among America's industrial firms (up from 146th last year). It is larger than such giants as Celanese, Avon Products, and Scott Paper, and only a shade smaller than Warner Lambert. This would make it a giant in some industries, but not in aerospace.

General Dynamics will post revenues of around $9.2 billion for 1986, McDonnell Douglas will have $13.3 billion, Boeing will come in at around $15.8 billion, Northrop at $5.3 billion, and Lockheed's total will be around $11 billion, to name just a few of the big players.

Ongoing programs will take Grumman through the 1980s with no difficulties, and into the 1990s as well. The first F-14A+ will appear next year, with the F-14D's coming on stream in 1990, a year after the A-6F's. It is unlikely that Grumman will ever be awarded another prime aircraft contract like that for the F-14; virtually all new aircraft programs will involve teaming arrangements.

The military aircraft business presently accounts for around 80 percent of sales (the F-14 alone was 25 percent of 1985 revenues), but will tend downwards thereafter, contributing less and less of the firm's income. At the same time other businesses could contribute substantially to profits. There is the Grumman Allied operation, which had a rough time of it until recently, but now, thanks to the Postal Service contract, will be turning around nicely. Financial analyst Gary

(Continued on page 16)



Cutting It Down To Size. *While Grumman is designing advanced products, it's also coming up with advanced ways to build them. The detail parts on the table were made with computerized machines whose cutting and drilling tools follow instructions contained on these microcassette tapes.*

What Business Is Grumman In?

(Continued from page 15)

Reich of Wertheim & Co. believes that by 1990 these activities could bring in profits of $29 million on revenues of $385 million.

By then Grumman finally might be better known for its electronics than for airframes and vehicles. It can be seen in some of the programs now in progress or shortly to be initiated, such as the Air Force's Joint Surveillance Target Attack Radar System (Joint STARS), and the Intermediate Forward Test Equipment (IFTE) for the Army.

The Financial Picture

Grumman is in the intermediate stage of a financial squeeze, due to the requirements of competing on this intense battleground. Compare the company to its competitors, such as General Dynamics, Lockheed and McDonnell Douglas.

Of these aerospace firms, Grumman has the lowest amount of profits, lowest earnings on capital, and largest debt as a percentage of earnings. This is a picture of a company struggling to come up with capital needed to finance its adjustment to the new technological dispensation. For example, during the 1983-1985 period, total earnings after taxes came to $432.7 million, of which $202.2 million went for company-sponsored research and development (net of government payments). High tech eats up R&D dollars, and as Grumman advances in this direction, such expenses are bound to rise.

Once Grumman comes over the shoals in the late 1980s the picture could brighten perceptibly.

This is a relatively new experience for the company. Time was when Grumman's net profit margin was five percent, and its return on capital over 20 percent. That was in 1983 — only three years ago. Then the corporation's long-term debt was $64.9 million; today it comes to $426.8 million.

So Grumman faces difficult challenges, but beyond those numbers are some pleasing prospects. For example, Grumman is completing a capital investment program in which over $625 million in new plant and equipment was added from 1982 through 1986. Such costs will decline in the future. Over $1 billion of the company's $6.8 billion backlog is accounted for by no-profit programs, undertaken to give Grumman an edge in future competitions. The profit ratios will rise when these expire. The profit margin for Grumman's aerospace activities is under three percent, while that for the rapidly expanding Data Systems is three times that figure. Also, it appears that profit margins on aerospace are improving. Once Grumman comes over the shoals in the late 1980s the picture could brighten perceptibly.

The Human Factor

Grumman has some unique advantages, one of which is its work force, which has the lowest turnover in the industry (4.5 percent) and is one of the most loyal —the average tenure of a Grumman employee is 12 years. There are more than 32,000 people at Grumman — and many of them are related.

For example, Jerry Norton's son, David, works on the E-2 program. Walter Aims Jr. is deputy director of Operations in Aircraft Systems' Product Development Operations Center. His grandfather worked here as a sweeper, and his father was a leadman in Building 1. Now Walter's son, Walter III, is an environmental controls technician. Old timers who go back 30 years and more provide the continuity often lacking in may large firms. Perhaps this is because Grumman has never had a truly major acquisition, opting instead for internal growth.

Quite A Year. *The company is not only investing in new machinery and buildings; it's investing in its people. These five Grummanites — (L to R) Ed Essig, Larry Sisco, Al Schmidt, Jeff Plummer and Richard Wolters — recently completed their first of two years in the Production Leadership Development Program in Aircraft Systems. Under this management trainee program, they are being groomed to be leadworkers in Manufacturing.*

Grumman people, directly and indirectly, are the largest shareholders in the firm. Today the Pension Plan owns around a half million shares, the Employee Investment Plan another 10 million — which makes up almost a third of the 32 million shares outstanding. Add to this the shares owned by management and Grumman retirees, and you would come close to a majority of the stock. This assures Grumman people that the company cannot be taken over without their consent.

The Future

Attempting to forecast beyond a few months or years can be a dangerous occupation, but it seems clear that by the end of the 20th century Grumman will be in the same kind of business it is in today: namely, serving the defense and aerospace needs of the United States and its allies, with all else being peripheral. Clearly there will be technological throwoffs into different areas, but the focus will remain where it is today, with increased stress on electronic capabilities.

To do so will require the fashioning of a somewhat different kind of labor force than Grumman has today, a process that is taking place right now. Recently the Department of Commerce indicated that half of today's work force will have to be retrained at one time or another — and that half of those who are retrained will have to undergo the experience a second time.

This is appreciated at Grumman. Bierwirth observes that the older generation was highly proficient in its way for that period, and that the new generation will have to acquire a new set of skills. "For example," Bierwirth says, "there used to be five men in Building 2 who had worked at Grumman a minimum of 20 to 30 years. They were able to tap a piece of metal as it came out of a machine, and by the way it rang they could tell whether they had it right or not. Then new machines came in. The younger people who run them dial in computer instructions, and the machines turn out perfect pieces of metal. These are people who grew up with computer games, and the computer came naturally to them. But it was a foreign instrument to the older generation."

The focus will remain where it is today, with increased stress on electronic capabilities.

Janet Soley, an Industrial Modernization project leader, is a member of another Grumman family. "My parents always spoke well of Grumman, and I thought it would be an exciting place to work," she says. At the company for nine years, she is involved with seeking better ways to produce hardware, so as to facilitate production and improve efficiency.

"Some of our equipment was behind the times a few years ago," says Soley. "In some respects the company had the same technology it started with. The idea has been to replace the tools and manual labor with computer-controlled equipment. Now the work is less physical and more mental. And it worked with all age groups."

The growth will be evolutionary rather than revolutionary.

Many industry observers believe that high costs will dictate moves off the Island, but top management disagrees — to an extent. Grumman will have some 40,000 employees 10 years from now; about 22,000 of them will be on Long Island. This means virtually all of the company's growth will be elsewhere.

Charlie Petri, a foreman in Central Cutting, will be retiring soon. He is one of those veterans who saw Roy Grumman and Jake Swirbul walking the plant floor, who saw the change from the Hellcats to the F-14s and E-2s. Petri arrived at Grumman in 1941, when the firm was hiring all the people it could find. A woodcutter before then, he became a riveter after attending Grumman's night school, starting out at less than a dollar an hour working on the Avenger. Looking back at his 45 years at Grumman, Petri recalls how proud he always felt to see Grumman planes flying overhead, and notes that the newcomers seem to have the same feeling about today's aircraft.

Charlie Petri recalls how Swirbul personally handed out the Christmas turkeys. "You didn't get your bird until you shook hands with Jake Swirbul," he says. "But now it's too big. You couldn't have one guy doing all of that."

Grumman will always manufacture aircraft, but it will also expand into fields Roy Grumman and Jake Swirbul could hardly have imagined. The growth will be evolutionary rather than revolutionary, and it will transform the corporation.

This is not new. Since its inception, Grumman has been in the business of anticipating and then capitalizing upon opportunities.

So the company is changing, constantly searching for outlets for its expertise, expanding into new markets, while enlarging upon its position in established ones. The firm that began as a classic iron bender is now a major force in electronics; installations that once manufactured low technology hardware now create some of the most imaginative software in the industry.

This isn't to suggest that a new Grumman is now emerging from the old, but rather that throughout its history Grumman has constantly sought challenges and the means to meet them.■

Transfers Up Dramatically In 1986

On The Go. *Above, Richard Bentley joined the Grumman family in October of this year. He last worked at Boeing in Wichita, Kansas. At left, Jim McDonnell and his daughter Rachel, 10, get ready for their 1,200 mile trip south. Grumman Melbourne Systems recently moved to its new home in Florida. In addition to relocations, Grumman handled 17,818 business trips in 1986. To keep a lid on costs, the Travel Reservation Incentive Program saved $602,000 this year. The most frequent destination: Washington, D.C., with Los Angeles in second place.*

Last weekend, Jim McDonnell, his wife, and 10-year-old daughter became three of the 326,000 people who move to Florida every year.

McDonnell is a software engineer for Grumman Melbourne Systems. The division is moving 200 people — its entire Long Island work force — to the city in Florida for which it is named.

Field Base Administration has directed about 400 transfers this year — quite a jump from the annual average of 100 in recent years.

McDonnell was tapped for the Joint STARS project last March; he had been working for Data Systems in Calverton. "I've wanted to move to Florida for a long time, but I didn't want to go unless I was a Grumman employee," he says. "When they asked me to join the Melbourne team, I didn't have to think twice."

The family is living temporarily in a townhouse condo in Satellite Beach, Florida, where they hope to find a permanent home. The schools in that town are the best locally, McDonnell says.

"I should be able to buy a better house here for the same money that I got for my house in Wading River," he says. "I certainly wouldn't want to do it the other way around.

"There are some things we'll miss about Long Island — my coworkers, family, and neighbors," he says. "But all things considered, it was time for a change."

Most of the other relocations were for new employees. Richard Bentley, a staff engineer in Advanced Systems, Building 5, Bethpage, joined the Grumman family in October of this year. The veteran engineer has worked for aerospace firms all around the U.S., most recently for Boeing in Wichita, Kansas.

"The most important factor in convincing me to come to Grumman was the potential for job satisfaction," says Bentley. "Compared to my assignments at Boeing, Grumman had a lot more to offer."

Bentley said the move was a tough choice because of Long Island's housing costs: the house they sold for $108,000 was big and luxurious, the $150,000 house they bought is much plainer. But the Bentleys like living near the art galleries and antique shops of Long Island's East End. Plus, they have old friends nearby.

"I'll be able to apply my experience to some really interesting projects," he remarks. "Grumman, in its current growth plan, can use my skills and talent. I think it makes a good match for both of us." ■

Racking Up The Mileage

Grumman trucks, vans and tractor trailers travel Long Island roads an average of three million miles a year — that's the equivalent of driving over 100 times around the equator. Tractor trailer driver John Wade (at the wheel) travels from Bethpage to Calverton twice a day — a 200-mile excursion — to deliver aircraft parts. Other drivers are (L-R standing) Morris Turner, James Sweeney, Ed Januszkiewicz, Bob Perinka, (kneeling) Randy Vanderloski and Bruce Anderson.

A Smoldering Situation: Smoking Banned In Work Place

Puffers, non-smokers try to keep their cool as new rules take effect

No Butts About It. *An overflowing ashtray of cigarette butts won't be seen in Grumman's buildings in Nassau County, L.I., anymore due to the county's tough law that restricts smoking in the workplace.*

NASSAU COUNTY, N.Y. — Many Grummanites at buildings here quit smoking a lot sooner than they had planned due to a new no smoking policy.

The rule went into effect on November 1, 1986 to comply with a tough Nassau County ordinance. Although the law went into effect February 1, the county issued waivers to many firms, including Grumman, giving them time to comply. The law prohibits smoking in the workplace except in designated areas. While smoking is permitted only in offices with floor-to-ceiling walls, the company encourages occupants to refrain from the habit.

Further east on Long Island, Suffolk County recently amended its law to place more stringent regulations on smoking — and Grumman is now formulating an amendment to the policy for buildings there. According to the Suffolk County Commissioner's office, if a supervisor gets complaints about a smoker, and the situation cannot be easily amended, the supervisor can ban smoking in the office. County officials say that there will be no changes in smoking laws in the near future.

Elsewhere, Grumman facilities are covered by the corporate policy, "Smoking In The Office Workplace," which went into effect in November 1984. The policy prohibits smoking in the public areas such as conference rooms, hallways, and restrooms and permits people to designate their immediate work area as a no smoking area.

How are Grummanites changing old habits? "From what I've seen, people feel it's a positive change and many of them have quit smoking or cut down," says Jim Byrne, manager of benefits planning. "Smokers and nonsmokers have told me that because the air is cleaner in the buildings, they feel healthier and aren't getting headaches anymore.

"Smokers and non-smokers are trying to be patient with one another," continues Byrne. "It's not easy to quit if you've been a smoker for many years. Many people who complain about the new law are the ones who haven't even tried to stop smoking. Grumman encourages all smokers to consider enrolling in the stop smoking FreshStart program, which is sponsored by the company and the American Cancer Society."

'I've heard of people getting into arguments over the new law.'

John O'Shea, a systems analyst in Building 30, has been smoking one and a half packs a day for 40 years. He's quit several times, but has always gone back. Now, he stands outside with co-workers during lunchtime to catch a smoke.

"The first few days were the toughest," says O'Shea. "I've heard of people getting into arguments over the new law. The smokers feel one of their rights is being taken away. I somewhat resent the restriction. It's like being back in high school again and sneaking cigarettes in the bathroom."

Someone like Mike Tedesco, systems analyst in Headquarters, will never know what that feeling is like. Tedesco has never smoked.

"There are no more clouds of smoke hovering over cubicles — obviously the environment is healthier," says Tedesco. "Before the law, I had never told anyone at work to put out a cigarette. But if people blow smoke at me, I've always told them to blow it in another direction.

"The law forces people to be more healthy," Tedesco continues. "Smokers say their rights are being infringed upon, but nonsmokers were inconvenienced for many years because they had to breathe someone else's smoke.

"I do respect people who quit cold turkey or at least cut down," he says. "Gaining 10 or 20 pounds is a lot better than ruining your lungs."

Day in and day out, Paul Holm's ashtray used to overflow with cigarette butts. Holm, Inventory Control staff assistant, Building 30, smoked 60 non-filter cigarettes a day for 38 years. Although he gained 10 pounds since he quit two months ago, he feels healthier and happier.

"I got tired of coughing all the time," says Holm. "I would inhale and there would be no more room for smoke. Besides, when the new law went into effect, I didn't want the aggravation of going outside to light up."

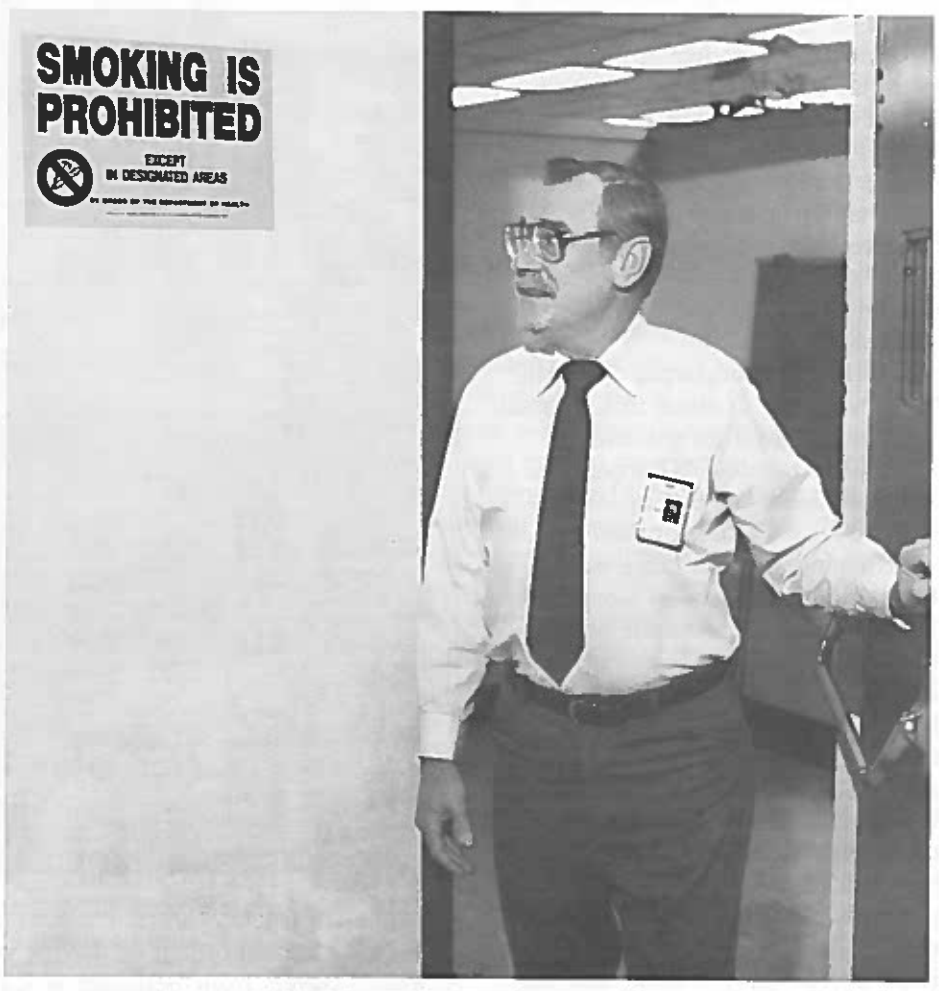
'There are no more clouds of smoke hovering over cubicles -- obviously the environment is healthier.'

Holm quit thanks to FreshStart. It consists of four one-hour sessions over two weeks. A session leader provides the 12 to 15 people in the group with health information and strategies to stop smoking. Grumman donates $25 to the American Cancer Society for each person who attends three of the four sessions.

"Only half of those who enroll will kick the habit entirely," says Holm. "Many participants are not fed up enough to quit smoking when they join the program. The smoker has to really want to stop."

Grumman set up the program at the end of 1984. In 1984-85, 550 people participated and 202 quit smoking. Since September, 87 people enrolled in the program and 38 kicked the habit.

Further information on FreshStart can be obtained by calling Byrne at (111) 62041 or (516) 346-2041.■



No Tar Or Nicotine. *Paul Holm smoked three packs of cigarettes a day for 38 years. Thanks to the Grumman-sponsored FreshStart program, he kicked the habit in 1986. (Photo by Rich Breunig)*

An Administrative Chore. *Under the drug testing program, urine samples are identified only by Social Security number when they're sent to a North Carolina lab. When the results are returned to Grumman, they have to be matched up by the Medical Department to ensure strict accuracy and confidentiality.*

Drug Testing — A Volatile Issue In '86

One positive side effect of drug testing is that Grummanites are seeking help on their own

Nineteen eighty-six will be remembered as the year employee drug testing became a volatile issue across the country. In June, Grumman joined the one-quarter of other Fortune 500 firms in setting up such a program.

Over 4,000 people have been tested since then — primarily new hires undergoing routine Grumman medical exams. "That's due to the sheer number of new people Grumman is now hiring," says John Brody, manager of health services for Grumman's Medical Department. "We average 150 tests a week in the Medical department in headquarters alone."

The North Carolina firm that conducts the tests uses the most sophisticated, and most costly, test available. Samples that fail an initial screening undergo *gas chromatography/mass spectrometry*, which provides a computer readout of virtually every chemical in the urine.

Six percent of those tested by Grumman have tested positive, which is on the low side of average. Most others that do the same two-step test have reported positive test results of seven or eight percent.

Rejected applicants can reapply for a job after 90 days. "We feel this is fairest," Brody says. "We're not trying to go after the rare user but the person with a chronic problem. Chances are, the former will not test positive after 90 days, while the latter will."

Current employees who test positive go to the Grumman Employee Assistance Program (EAP) for help. "The EAP has had a big jump in the number of employees seeking help, people who weren't even asked to undergo drug testing," says Brody. "In fact, more have come in for help than have tested positive, and we feel that's a good thing. In addition, we've been able to get smaller sites involved in the EAP that didn't have drug awareness and treatment programs before."

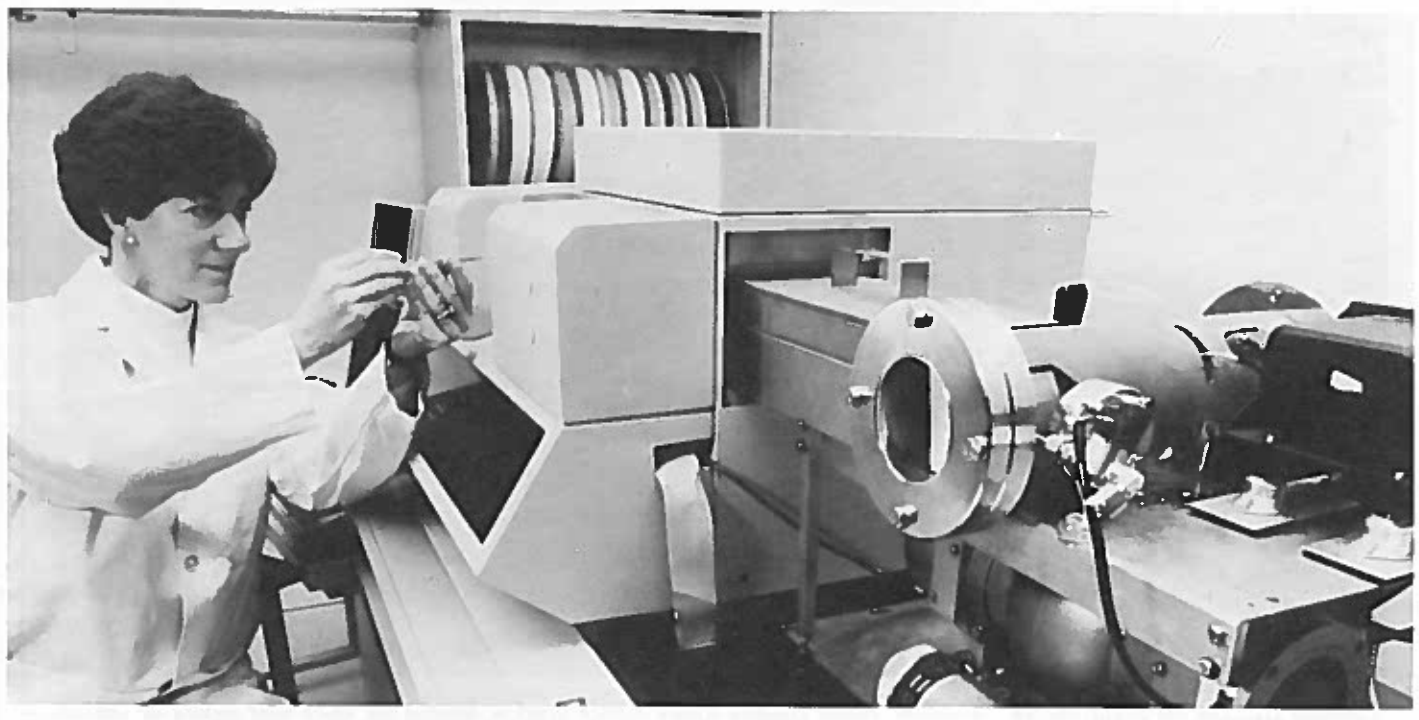
Follow-up tests are conducted after an employee completes a treatment program. So far, only three employees have been dismissed for resuming drug abuse.

Brody was surprised that the number-one illicit substance identified by the tests was marijuana, with cocaine a distant second. "Ironically, marijuana stays in the bloodstream much longer than more harmful drugs," says Brody. "I also think we see marijuana positives because people wrongly assume we're not even looking for it."

The drug testing program is an administrative chore: the samples are identified only by social security number when they're sent to the lab. The results come back the same way, and have to be matched up by Grumman in Bethpage, to ensure strict accuracy and confidentiality.

"Every site has to use the same test, the same forms, and same procedure," Brody points out. "A chain of custody form, attached to the sample, must be signed by every person who handles a urine sample. If it's not, the test has to be done over. I spent from June through October visiting every Grumman site, to make sure everybody got off on the right foot."

Brody has fielded inquiries from a few lawyers representing rejected applicants, but no one has sued Grumman on this policy — yet. Brody points out that most of the companies that have been sued have relied on cruder — and cheaper — tests, and haven't policed the handling of samples as tightly as Grumman does. That has led to inaccuracies and improper dismissals at those firms.■



Double Check. *Grumman sends urine samples to CompuChem Laboratories of Research Triangle Park, North Carolina, for drug testing. Above is a machine that performs gas chromatography/mass spectrometry (GC/MS), the most sophisticated test available. This second step is done on all samples that fail an initial screening. GC/MS produces a computerized readout of every substance in a urine sample.*

Grummanites Use Variety Of Methods In Their Quest For A Better Way

Project Sterling Nears '86 Goal Of 3,000 Suggestions

This year, Bob Verzera of Building 30 in Bethpage is $6,595 richer — thanks to a good idea that saved Grumman $86,000.

Verzera was this year's biggest winner in the Grumman Project Sterling employee suggestion program, which rewards clever suggesters with a percentage of the savings that result.

Sometimes, a winning solution is deceptively simple.

Due to an engineering change, a diagonal brace in the passenger seat of the C-2A Greyhound had to be made slightly longer. Earlier this year, Verzera was asked to obtain a price quote from the vendor for 268 such brace assemblies.

"The brace is a tube with two end fittings," says Verzera, who was a major subassemblies buyer at the time and is now purchasing manager of machined parts for Central Procurement. "I suggested moving each end fitting out half the increase in the length needed, instead of cutting the tube and installing a plug."

Verzera's suggestion saved manufacturing time — time for which Grumman would have had to pay the vendor. The award money will come in handy — Verzera just bought a vacation house in Pennsylvania.

By the end of the third quarter of 1986, 2,164 Project Sterling suggestions were submitted by Grummanites — about 200 more than the same time last year. By year's end, the program should exceed the 1985 total — 2,509 suggestions — and come close to the Motivational Programs' 1986 goal of 3,000 suggestions.

The figures also represent a turnaround in participation: the total number of suggestions was decreasing slowly for several years, though individual awards have gradually increased.

"This year, we spent a lot of time and effort to push the program, and explain it to the newcomers," says Paul DiBenedetto, manager of Motivational Programs. In 1986, Data Systems people were invited to participate in Project Sterling for the first time. Motivational Programs is now evaluating 10 suggestions from Grummanites in this division.

All suggestions approved in 1986 will be eligible for additional accolades at the annual Project Sterling awards dinner, scheduled for March. The people who won the biggest cash prizes won't necessarily get an annual award — the effort of all suggesters is evaluated and an up-to-date assessment is made of the benefits generated by an idea.

In 1987, the program will begin awarding Grumman stock to suggestors who win awards of $250 and more. Up to $249, winners will continue to receive cash awards. The stock is purchased on the open market. It isn't like Employee Investment Plan stock, which is held in proxy by the company. Project Sterling winners will be issued a stock certificate.

The first stock awards were made this month for the 1986 Individual Performance Awards. These Grummanites received five shares of stock. They were nominated by their department head as outstanding performers. Everyone up to the level of supervisor or group leader was eligible; the top managers of the year won navy blue blazers.

Motivational Programs presented 650 Individual Performance Awards this year — a big jump over the 1985 total of 400 awards. DiBenedetto attributes the jump to the fact that the program now covers most Grumman divisions. ■

Winning Big. *Bob Verzera of Building 30 in Bethpage is a happy man these days — he won $6,595 on his first Project Sterling suggestion ever. He plans to put it toward his vacation house in Pennsylvania, shown above.*

Thumbs Up. *On the flight line at Calverton, plane captain Vinny Picece gives a Tomcat the once-over before he lets an F-14 test pilot put the plane through flight tests. The new F-14A+ with its more powerful engines begins rolling off the Calverton production line next year.*

16 Quality Circles Formed

The Quality Circle program boasted 16 new circles in 1986. The program encourages innovative problem-solving which on many occasions leads to cash savings and increased productivity.

Members of a quality circle get together to talk about about problems in their area and come up with solutions. Circles have tackled such problems as improving the routine for labeling shelves in stockrooms, editing forms to make them clearer and more concise, and improving department communications as well as the work environment.

The program has had a 75 percent success rate since it was formed in 1981 — considerably higher than the 25 percent average at many other companies. Success is measured annually by the number of circles and projects.

Once a circle has completed its problem-solving mission, it will either disband or begin working on another problem.

Since 1981, 119 circles have been formed. Each of the 53 circles now in existence includes 10 Grummanites. In addition to the 10 Tech Services circles started in '86, there are five in the Services Division and 38 in the Aircraft Systems Division. Each year, project awards are given to the most outstanding circles.

If you are interested in forming a quality circle in your department, call Joyce Sparling, program administrator, (111) 51819 or (516) 575-1819.

Grumman: A Good Corporate Citizen

Employees donate time and money to many worthwhile charities

"The government's not handing out a lot of money to nonprofit agencies these days," says Sharon Grosser, manager of community support programs and chairperson of the Employee Contributions Council. "Plus, the new tax law cuts the deduction for charitable contributions, so individual donors will no doubt cut back. That will put a big demand on corporations."

Grumman donates slightly over $2 million a year to organizations across the U.S. Because that amount has remained constant in recent years, the Employee Contribution Council wants to ensure Grumman accomplishes the most with its money: larger grants are made to fewer groups. For example, instead of donating $500 each, no-strings-attached, to dozens of mental health groups, the council will support a few well-run groups with specific projects.

The council then does follow-up work. "We make sure they're accomplishing their goals and the funding is well-managed," says Grosser.

One of Grumman's most successful efforts is the annual Food Drive. This year's tally isn't available yet, but last year, Grummanites nationwide donated 14,000 pounds of food to the needy. Grumman is also funding special hunger projects such as a self-help group for single mothers.

In addition to food and money, Grumman encourages employees to donate their time. Since people usually do this on their own, there's no way to provide an accurate total of employee volunteers. However, Grumman has some programs of its own: about 50 employees on Long Island and three in Stuart, Florida, have been trained as reading tutors through a program cosponsored by the company and the Literacy Volunteers of America. In 1987, more sites plan to get involved.

The following are but a few of the Grummanites who give their time and talent to worthy causes.

After hours, Paul Andrisani, manager of facilities planning for the Electronics Systems Division's Great River Operations, helps provide needy families with a roof over their heads.

Andrisani does architectural and engineering work on ruined houses for the Bellport Alliance, a nonprofit group in a depressed part of Long Island. "Usually, a home has had at least one fire," says Andrisani. "A complete remodeling is required — new plumbing and wiring, roofing, walls, insulation. It is then ready for a family."

He also teaches a course for low-income people on home improvements, reading blueprints, and energy efficiency.

Ironically, skyrocketing real estate values in Suffolk County haven't eliminated substandard housing. "When property values were lower, the Alliance handled a lot of abandoned houses," he says. "As they've gone up, absentee landlords are hanging on to them. They do nothing to fix up a house, they pay a fine when they have to, and they keep asking more for rent. All this has made it very hard for low-income people to find a decent place to live."

At Grumman, Bob Cruz is assistant to the director of quality for Aircraft Systems' Bethpage Operations. He's also on the Employee Contributions Council. Outside work, Cruz is vice president of a civic group in Brentwood called Adelante. Adelante is Spanish for "forward," and one of its projects is holiday food baskets for the hungry. Baskets include a turkey, vegetables, cookies, pie, cranberry sauce, cider — everything you'd need for a holiday dinner.

Cruz also works with the Brentwood Lions Club and an organization called Pronto. In addition to food distribution, the groups raise money for scholarships, help the poor get training, and notify them of job opportunities.

Cruz spends 10 to 15 hours a week on these projects, and sees a growing need for them in the Hispanic community. "The area where I live has the second highest concentration of Hispanic people in the state — and it keeps growing," he says. "Many are undocumented aliens, in need and reluctant to seek help. We help them, no questions asked."

Ten years ago, Jack Mango and his wife banded together with friends to assist the family of a deceased neighbor. The informal project later grew to become Helping Hands, an outreach organization sponsored by the Mangos' church in Hauppauge, Long Island.

The group mainly donates food, clothing and Christmas toys to the needy. "Surprisingly, we always have enough to meet the need," says Mango, a senior technical writer for ILS Publications. "When we need clothing, all we have to do is tell the parish the size, and we get it. Much of it is brand-new."

The busiest times are before Thanksgiving, Christmas/Chanukah, and Easter holidays. Says Mango, "Being involved in Helping Hands makes the holidays exactly what they're supposed to be about: helping your fellow man."■

Volunteer Architect. *Paul Andrisani of Great River Operations helps renovate rundown houses for low-income families. He does engineering and architectural work and helps write proposals for funding.*

Good Causes. *Above, Al McDonald, an administrator in Corporate Services and a Literacy Volunteer, has been teaching English to Aisha Waheed since she moved here six months ago from Pakistan. Left, Jack and Rosemary Mango sort clothing bought for Helping Hands of Hauppauge, Long Island.*

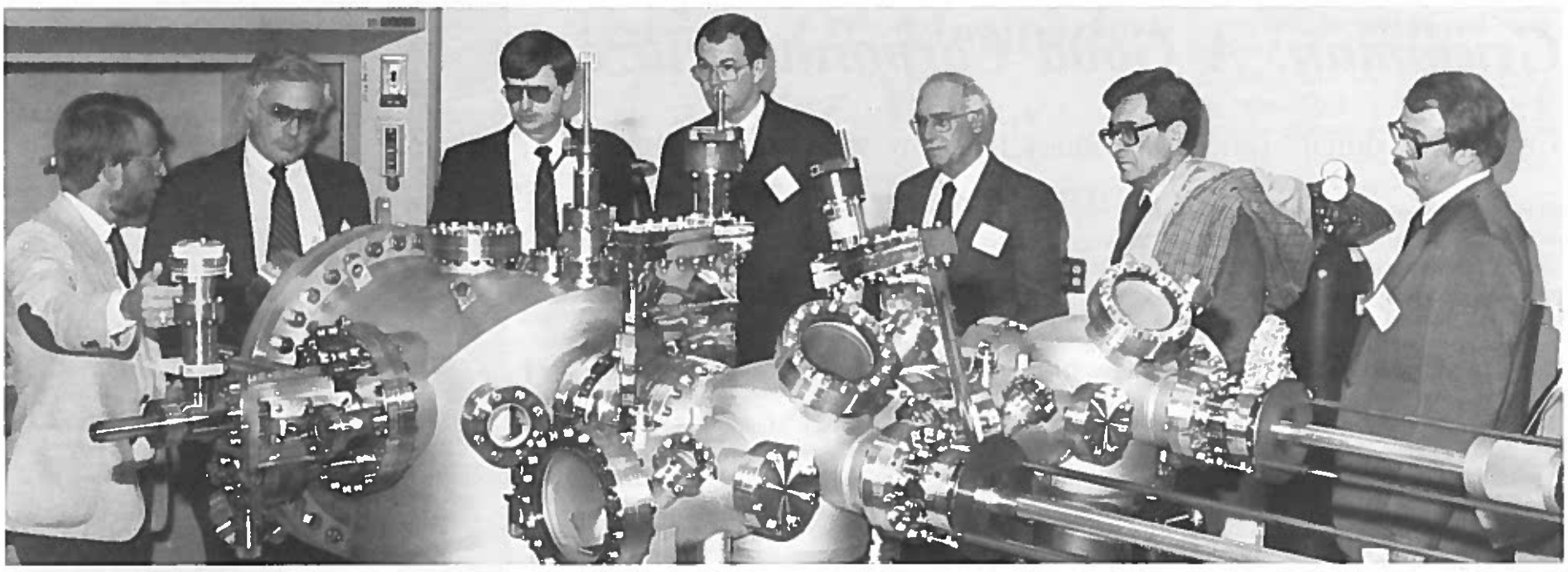
Holiday Cheer. *Bob Cruz (R) joins members of the Adelante Civic Association of Brentwood, Long Island, in making holiday food baskets for the needy. From left are Hilda Irizarry; Paul Irizarry; Alice Blanch; Angel Rivera, a methods engineer on the Long Life Vehicle in Bohemia; and Cruz.*

United Giving

In October, Grummanites throughout the U.S. contributed over $1,052,000 in the 1986 Grumman United Way Campaign.

In all, there are 37,000 voluntary agencies and hospitals nationwide that receive funds from the United Way — such groups as the Association for the Help of Retarded Children, American Red Cross, Boy Scouts, Salvation Army, Urban League, and United Cerebral Palsy. One out of three Grummanites receives assistance from agencies supported by the United Way.

Over and above the employees' contribution, Grumman Corporation made a donation of $275,000 to the United Way of Long Island.



Molecular Research. *Dr. Ron Pirich, lab head for Solid State Physics and Chemistry in Grumman's Corporate Research Center, shows Grumman's molecular beam epitaxy machine to University Technology Forum attendees. The machine forms high quality single crystal semiconductors.*

Grumman And Universities Share Their Brainpower

High technology: Grumman aims to create a public image for itself as a leader in this field. In doing so, strong links must be forged between the company's scientists and engineers and the academic and professional world.

In 1986, Grumman has 16 university affiliate programs in which it cooperates with colleges and universities on research. The list reads like a who's who in high-tech: Massachusetts Institute of Technology, Rensselaer Polytechnic Institute, Cornell, Stanford, to name a few.

"University affiliation has definitely grown over the last few years," says Ed Wesche, administrator of the professional activities office for the Aircraft Systems Division and secretary of a company committee that oversees these programs. "The government is encouraging industry to do it."

In academia, professors and students gain technical expertise and a view of the business world. Grumman obtains the results of long-term research projects without spending the large sums needed to supplement its own studies. Grumman can also influence curricula and future research at a school, and build a pool of potential employees.

Some affiliate programs involve a fee or grant to the university, others are done with National Science Foundation funding. In all cases, a Grummanite who is an expert in the field acts as a coordinator for the program.

Grumman often purchases outright the services of a school and its scientists. This is quite common these days, especially in defense research. In 1986, Grumman entered into 13 such agreements.

Grummanites' involvement in technical societies also strengthens the company's technological I.Q. Grummanites have authored 232 technical papers for professional symposia in 1986.

In addition, 18 articles penned by Grummanites have appeared in trade journals in '86.■

Almost half of the technical presentations are submitted by scientists in Grumman's Corporate Research Center. Where a decade ago most Grumman authors wrote papers on aeronautics and space, the three hottest current topics are robotics, composites, and artificial intelligence.

Grumman supports the authors of these works through assistance with presentation materials, as well as technical advice. The payoff is new business: the X-29 advanced technology demonstrator, for example, started out as a flurry of papers on the forward-swept wing, fly-by-wire technology and composites.

Every year, Grumman sends out invitations to colleges, universities, and other technical schools throughout the U.S. The event: the Grumman/University Technology Forum, a two-day affair featuring seminars, tours, and a speaker who's achieved some celebrity in a technical field.

Grumman held its seventh annual University Technology Forum on November 10-11. This year's 140 attendees represented most of the Northeast's engineering schools, as well as schools across the nation. Speakers from both Grumman and academia covered topics such as future flight vehicles, faculty shortages, and artificial intelligence. The guest speaker was aviation pioneer Scott Crossfield, one of the first experimental or "X" plane pilots.

Among the outreach programs established this year is the Leroy Grumman Lecture Series. The series aims to continue founder Leroy Grumman's commitment to excellence by providing science lectures for employees. The first lecture was in September and attracted 250 Grummanites.

Another new program, Partners in Education/Industry, involves four Long Island school districts in communities where Grumman has major operations. Grumman provides slide presentations, use of its technical library, lectures and tours, help at career days and science fairs and assistance to students with independent projects.■

Gebhard Named Inventor Of The Year

Pilots compare using Dave Gebhard's invention to getting a swift kick in the seat of the pants.

Gebhard designed a jump strut to help planes achieve lift in short takeoffs. For his patented idea — no. 4,524,929, to be exact — Gebhard was recently named Grumman Inventor of the Year.

Fitted to the landing gear, the jump strut makes an airplane take a vertical leap into the air without having to reach the ground speed necessary for liftoff. The plane only jumps five to 10 feet, but that's enough to give it lift. In addition to reducing the length of runway needed by as much as 60 percent, the jump strut can increase the plane's payload.

Gebhard retired from Grumman in 1984 and is currently an engineering consultant. He came up with the idea for the jump strut in 1980 while researching ways to provide aircraft with short takeoff and landing capability. In 1981, Grumman was one of two winners in a field of 26 competing for Air Force funding of high-risk projects.

Teamed with Menasco, Inc., Grumman went on to develop a nose gear jump strut suitable for use with the X-29. The strut was successfully flight tested last fall at the Naval Air Test Center, Patuxent River, Maryland.

A joint patent earns a measure of prestige for both the inventor and the company. But more important, it provides Grumman with a legal right to prevent others from using the patented information unless authorized to do so.

Twenty-nine Grummanites have thus far earned joint patents for their inventions in 1986. Previously, 148 Grummanites had been issued patents — the first, company founder Leroy Grumman himself. His "flying boat and like craft" was patented on April 7, 1931.

Inventor Of The Year. *Based on Dave Gebhard's (kneeling) invention, the Grumman/Menasco team flight tested a jump strut at the Naval Test Pilot School, Patuxent River, Maryland. Others are (L-R) Ralph Snow, Menasco senior design engineer; Lt. Cdr. Carl Engelbert, project pilot; Lt. Cdr. Raymond Craig, project officer; Keith Derr, lead project technician; Ronald Harney, test director; and Gene Garcia, plane captain.*

Training's A Must In Today's High-Tech Workplace

If you took all the Grummanites enrolled in company-sponsored educational programs, you could easily fill a mid-sized college campus.

Though some Grumman divisions offer different educational opportunities, the company is unified on one goal: making sure the Grumman work force has the skills and brainpower needed to meet the high-tech challenges of the '80s.

Time was, the average Grummanite needed only a high school education to do his or her job. That isn't so any longer. In both offices and factories, people's jobs are evolving. They increasingly involve new technologies and processes, esoteric materials, and the latest computer equipment. A course or two may be sufficient, but sometimes the change requires the employee to obtain an associate's or bachelor's degree in a new skill.

One of the most popular of the employee benefits is the tuition reimbursement program. Over 3,000 Grummanites went to college on Grumman in 1986 — double the number in 1980.

Grummanites in the tuition reimbursement program are overwhelmingly enrolled in three curricula: business, 48 percent; engineering, 28 percent; and computer science, 22 percent. Other majors account for only 2 percent of the total.

Over 1,000 more Grummanites than last year enrolled in the Career Education and Training Department's corporate training courses on Long Island. The program offers people the opportunity to maintain their present skill level or to increase their knowledge in new technology.

Voluntary courses are offered after work. Some courses are selective; Grummanites must be nominated by their supervisors to take courses in management development, university programs, programs for women and certain professional development courses.

Courses are conducted by Grummanites in the Career Education and Training Department, located on the concourse level of Headquarters in Bethpage. Over a 12-week period, most courses meet once a week for two and a half hours.

Participating divisions in the program are Aircraft Systems, Electronics Systems, Services, Aerostructures, Space Systems, and Melbourne Systems. Grumman Data Systems joined the program this year.

Aircraft Systems Division's Product Training Department offers job training in skills and systems.

Training is conducted on site at responsiblity centers, where training requirements are established. When students become proficient, they take certification tests.

Systems training includes the operation, integration, maintenance, and test of both aircraft systems and ground support equipment. Skills training includes the assembly and repair skills required for both electrical and structural tasks, primarily in manufacturing. More than three times the number of Grummanites enroll in the skills program.

In 1986, 1,554 students participated in 183 systems courses, while 6,638 people took part in 230 skills courses. In 1985, 1,653 systems participants enrolled in 222 courses, while 5,899 Grummanites received skills training by taking 205 courses.

Ed White is training to be a welder under the skills program in Building 2, Bethpage. Since July, he has learned to weld aluminum, steel and titanium.

Currently he's welding A-6E aluminum engine air diffusers. "I've learned so much," says White. "Aluminum must be rinsed with acid, then water, then dried before I can begin welding. The blueprints tell me where I should weld each piece."

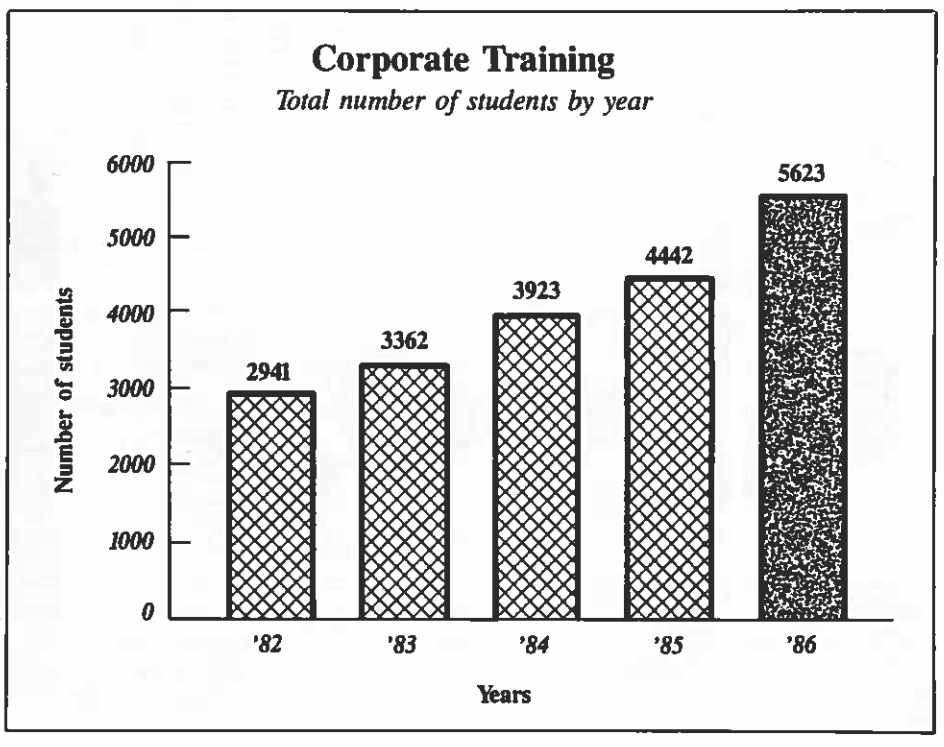
White, who is just about ready to take his certification test, has worked with steam welders and spot welders on a number of assembly work projects for the EA-6B, C-2A and A-6F. ■

Class Of '90. *Thomas Kleint is now in his junior year at Polytechnic Institute of New York. An Aircraft Systems' engineering aide, he is studying mechanical engineering. 'With the expense of education today, the Grumman Tuition program is definitely an asset,' says Kleint, who estimates that he'll get his four-year degree in 1990. He works on the A6-F Program in Building 40, Melville.*

More People Hit The Books

Year	Students	Amount spent
1981	1,570	$476,707
1982	1,860	593,240
1983	1,882	731,552
1984	2,380	1,113,767
1985	2,739	1,396,574
1986*	3,239	1,878,036

**1986 figures are estimated.*
Source: Grumman's Career Education and Training department. Grumman Allied and Grumman St. Augustine Divisions are not included. Figures for the Technical Services Division are included in the 1984, 1985 and 1986 statistics.



Where Credit Is Due

A special thanks to the Grumman photographers who contributed to this issue.

They are: Richie Breunig, Gerry Costello, Bob Sagliocca, Bob Settles, Karl Thoma and Marie Trimborn.

Grumman World — Vol. 5, No. 22, December 22, 1986. Published twice a month for active and retired employees of Grumman Corporation. 1111 Stewart Ave., Bethpage, N.Y. 11714. W.B. Jones, Vice President-Public Affairs.

Norine Lyons
Manager — Internal Communications
575-3720

Kathleen Housley
Editor — 575-3293

Associate Editors
Debra Pagan — *575-8999*
Bob Sample — *575-5118*
John Vosilla — *575-5119*

Bernadette Gately
Editorial Assistant — 575-4334

GrummanWorld
December 22, 1986

★★★★★★★

1986 Annual Report For Grumman People

'We have locked onto a bigger future than anyone could have imagined'

★★★★★★★

This special issue of *Grumman World* is dedicated to all 32,994 of us who contributed to Grumman's success in 1986.

GrummanWorld
Grumman Corporation
A22-GHQ
Bethpage, N.Y. 11714

Bulk Rate
U.S. Postage
Paid
Hicksville, NY
Permit No. 1110

Benjamin J. Mroz (R)
201 Gilling Rd.
Seaford, NY 11783